ELECTRICAL REVIEW

[ILLUSTRATED.]

A WEEKLY JOURNAL OF

ELECTRIC LIGHT, TELEPHONE TELEGRAPH AND SCIENTIFIC PROGRESS.

Vol. 8. No. 13. WEEKLY. NEW YORK, SATURDAY, MAY 29, 1886. $3 per annum. Single Copies, 10 Cents.

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Entered at Post Office, New York, as Mail Matter of the Second Class.

Victor Telegraph Instruments.

Improvement is the constant effort of the manufacturers in the electrical business, and no house is more wide awake in this respect than Messrs. E. S. Greeley & Company. In no one department has this been more fully demonstrated than in the manufacture of telegraph instruments, and in the new "Victors," illustrated in this edition, the managers of this house are satisfied that they have attained a very high degree of perfection. An axis with the minimum of friction and the maximum of stability is the desideratum, and there is no one good reason why that axis should be given lateral adjustability while a world of argument is arrayed against it. There is one fixed central position that is desirable in the axis of a telegraph key, relay, sounder and kindred instruments, and when that fixed center is departed from, an injury commensurate with the degree of deviation is inflicted. Wobbling levers, chewed off contacts, choked transmission and general "drunkenness" of action are the inevitable results of badly made and "worked loose" adjustments. On all instruments constructed upon the Victor principle and under the Victor patents, there is one fixed central position for the axis, which position is determined to a mathematical nicety by expert mechanicians in their factories, and for any departure from that fixed center to occur is absolutely impossible without dismounting the instrument. The manufacturers state that to the individual who is still a believer in the stage coach in preference to a Pullman, or who prizes the antiquated quill above a Gillott's, they have not a word to say. But to those who mean to and do keep abreast of the times, they commend the Victor instruments. Their extended experience in and intimate knowledge of the requirements of telegraphic machinery is a sufficient warrant that their verdict merits much consideration. Throughout the construction of the entire set of Victor telegraph instruments they have listened to every petition presented to remove clumsiness, dead weight, and false conceptions of utility and art.

On the Thames in an Electric Launch.

Scudding along on the bosom of Father Thames, without sign of oar or sail or steam boiler! Truly it was a delight and a wonder—a delight to us who were favored with a seat in the boat, and a wonder to the craft we passed and to the spectators who soon gathered on pier and bridge and embankment. No visible motive power, and yet we shot through the water at a rate which quite outdistanced the bulldog tugs, and even caused consternation and surprise on the bridges of the larger steamers carrying passengers.

Surely here was a second Captain Nemo with his electrical boat, which moved or was still, answered the helm with or against the tide with equal ease, and perhaps—who knows—even descended into the water, at the will of the owner! She did not explore the depths on Saturday, though, and no one was sorry, for she did not seem altogether fitted for submarine travel. One attempt, indeed, she made, but nobody appeared to like it, so to the surface again she returned. Perhaps the gentleman in command thought he would give us a taste of what the boat could do if necessity arose, but had pity on us when he recollected that no provision had been made for going to the bottom of the Thames. Or perhaps it was only that she shipped a sea in the rough water in the Pool, and our excited imaginations immediately suggested that we were to be submerged. At any rate, we got wet, and let it be distinctly understood that we preferred to remain, for the present at least, fair and square, on the top of the water.

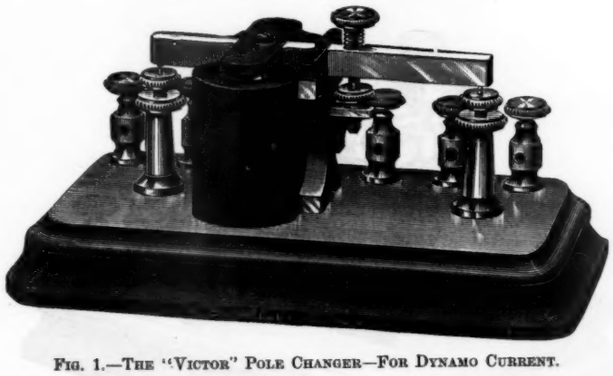

FIG. 1.—THE "VICTOR" POLE CHANGER—FOR DYNAMO CURRENT.

FIG. 2.—THE "VICTOR" POLARIZED RELAY FOR QUADRUPLEX SETS.

We met on Charing Cross Pier; quite a number of electrical celebrities arrived a little later; and presently, up the river came Mr. Reckenzaun's wonderful little launch, with two or three ladies on board, Mr. Reckenzaun himself, Mr. Stephens, and the assistants required for the management of the boat. Simultaneously with their arrival, there came on to the pier a turbaned Hindoo (I am not sure that he was a Hindoo, but he was turbaned and was of Oriental appearance, so that's sufficient), who, with astonishing temerity, walked straight to the edge, and, without hesitation or apparent misgiving of any kind, descended into the launch as though he had known it all his lifetime and it had come now particularly for him. The others, not quite so stolid, stayed, to remark on the boat's appearance and calculate its capacity, to greet its occupants, and to assist the ladies to *terra firma*. (Is that pier "*terra firma*," by the way?) It was clear there was not room on board for all who were prepared to commit themselves to the mercy of the waves—(there were waves)—so something like thirty souls went off first for a short cruise, and as many, or more, waited. "The anchor's weighed!" roared Mr. Stephens, and the boat was steered away in the direction of Westminster; without passing under the bridge, it crossed the river, came back on the other side and recrossed.

I do not think anything very exciting occurred on the first trip; nor, indeed, on the second. But subsequently we had quite an adventure. "Boat ahoy!" shouted a "jolly young waterman," making straight for our boat. (I did not hear him say, "Boat ahoy!" but that is the proper thing to say, and no doubt he said it.) Visions of pirates, of highwaymen on the river, for a moment made me wish myself safe on the Embankment; but I was soon reassured when I saw that the j.y.w. could not keep pace with our little clipper, and heard him call for nothing more dreadful than "Your license!" The youth at the rudder was addressed, but for all notice he took of the demand he might have been as great a stranger to the language of the waterman as he probably was to that of the turbaned Hindoo. Our boat did not stop, and the other began to fall behind, although "young Tom Tug" made desperate efforts to keep alongside, all the while shouting for the license and commanding us to stop. All his skill, however, was futile, and presently he desisted from the attempt to overtake us, and contented himself with yelling that he would make us "Pay for this," and shaking his fist at us. On the return journey, when he saw us coming, he again made for the middle of the river, but he hadn't time to get within hailing distance before we passed the point for which he was making. I had observed this young man rowing about the river previously, and eyeing very closely the mysterious little boat, which he did not seem quite able to make out. Evidently he came to the conclusion that it was illegally plying for hire, and he resolved to put a period upon its operations. He must have been chagrined by the way in which the occupants of the demon boat ignored him and his importance.

Mr. Stephens entertained us with a description of the main points of the launch; and a man readier with anecdote *apropos* I never encountered. "How thick are the plates?" enquired a passenger. "One-sixteenth," replied Mr. Stephens. "Only one-sixteenth!" "Ah, you are like the man who built a boat with plates three-sixteenths of an inch in thickness, and would not trust himself in it upon the water because there would be but three-sixteenths of an inch between him and eternity!"

Many more lively little stories like this kept us all in good humor; and Mr. Stephens had a happy way, too, of giving us the information we desired to possess respecting the boat. "She has a very peculiar bottom," he told us; "and, upon my word, I believe she would turn on her own center." With a length of 37 feet and 6 feet breadth of beam, the launch was fully capable of carrying comfortably 40 persons. Seats ran around the sides, and the passengers faced each other. She was built some time ago by Yarrow & Co., the famous torpedo boat builders, and is intended for the service of the Italian Government, who will use her for general harbor purposes, laying torpedoes, and other work for which she is peculiarly adapted. The arrangement of the motors, the secondary batteries, and the switches, which are all out of sight, is precisely the same as that in vogue on the tramcar system devised by Mr. Reckenzaun, and which the ELECTRICAL REVIEW has fully described.

We had ample evidence of her powers of speed, for she was put through her paces for our benefit on a straightaway run from Westminster Pier to Charing Cross Pier. Mr. Gisbert Kapp timed her as doing just two minutes. This distance, according to the map, is about 730 yards, and a rough calculation since worked shows that the speed attained was at the rate of close upon 12½

miles an hour—somewhat faster than that accomplished by the Great Eastern, which found it difficult in its journey to Liverpool to get above 5½ miles an hour. Of course we had the tide in our favor. When upon her trial on the measured distances at Greenhithe, the boat showed an average speed of 9½ miles an hour with the tide, and of 7½ miles against it. These, however, were at the ordinary working speeds, and when we timed her she was under what may figuratively be termed "high pressure." Fifty miles, on another occasion, she accomplished in six hours; very satisfactory work.

Well, the boat behaved capitally on Saturday, and the three-score or so of interested visitors were highly pleased with her performances. Those who left her at Charing Cross, particularly, had nothing to damp their satisfaction; the few who returned to Millwall with her were not quite so fortunate; but then it was only that the water just below London Bridge got a little inquisitive, and the top of a wave jumped in to see for itself what made the boat move. That was all. But the consequence was that, although but tyros in electrical navigation an hour previously, we immediately became "wetter uns."—*London Electrical Review.*

The Cable Rate War in Its True Light.

A week ago you did me the honor to publish a letter on the fierce fight raging between the four pooled cable companies and the Commercial Cable Company. As an economist fighting for the last twenty years the monopolies, combinations and manipulations of a linked-together class against the interests of the great multitude, wherever I find them, my readers will not feel astonished that I should take a lively interest in this fight, and that I should continue to expose this cable monopoly in all its bearings. I have, since last writing, fortified myself with the proceedings of the pooled cable companies, their returns and statistics, also with arguments brought to bear on the subject made by the very organ of the pooled companies, namely, the *Electrician*, a paper issued in London, and entirely devoted to the interest of the fighting monopoly. I find that Mr. Pender, who seems to be to ocean telegraphy what Sir Joseph Porter, of "Pinafore" fame was to the navy. One was the "Monarch of the Sea," and the other aspires to be "Monarch of the Ocean." Well, Mr. Pender, the Chairman of the "Direct United States Cable Campany," met his shareholders on the 23d of January last, and laid before them the annual report and balance sheet. The financial results of the year's business did not seem to have been very satisfactory, and the Chairman laid the blame to two causes: First, that there were too many ocean cables, and secondly, to the unwarrantable reduction of the latest and only independent cable company of 4d (or 8 cents) per word in ocean telegraphing. To use his own words he said:

"I dislike above all things what I would call throwing away money. The reduction of 4d. which was made when the Mackay-Bennett Cable came into the market benefited no one. It did not benefit the sender, and it has not increased the traffic. It has been an advantage to no one. It was merely throwing £200,000 into the sea." * * *

The "Monarch of the Ocean," I mean Mr. Pender, will pardon me when I point out to him that even Sir Joseph Porter, the "Monarch of the Sea," could hardly have uttered a sillier paradox. If the reduced 4d. curtailed the revenues £200,000 or $1,000,000 that amount must have remained in the pockets of the senders, and, remaining in the pockets of the senders, how in the world was it thrown into the sea? The only excuse I can find for this paradox is that the saving of a million dollars by the senders of cable messages was indeed a waste, because it did not find its way into the pockets of the pooled cable companies. And Mr. Pender good humoredly invites the Commercial Cable Company not to be wasteful, and try to put some of this waste into their own pockets. The good-natured Chairman was rather sanguine at the time of persuading the Commercial Cable people to retract the errors of their way.

On the 15th of February the Right Hon. Viscount Monck presided at the annual meeting of the Anglo-American Cable Company. His annual statement was also far from being satisfactory. And as the refractory new company had given no sign of coming into the pool or raising the price to a higher standard, the noble lord gave intimation that there would be a fight if these Commercial Cable people would not listen to reason. "There was a limit to forbearance," said his lordship, "and they must come to a battle of rates at last." Well, the battle of rates did come on the 5th of May. In the meantime, the *Electrician*, the organ of the monopoly cables, on the 30th of April had a most savage article on the situation. The following extracts will speak for themselves:

"In self-defense (says the *Electrician*) and as a last resort, the stronger of the two combatants may quite justifiably put forth his whole force to crush his opponent, rather than tamely submit to being starved into condition of feebleness from which there will be no recovery except on terms dictated by the weaker foe."

Now, in Heaven's name, what was this fearful dictation? Or what was this starving into condition of feebleness? A new company having laid two cables under favorable circumstances, has found that 1s. 8d., or 40 cents, a word would pay them a fair interest for the money invested, and that by such a charge the senders of cable messages would save 20 per cent. Or, as Mr. Pender more paradoxically states it, throw £200 into the sea. Of course, we can understand if the pooled four cable companies were the sole owners of the ocean, and that that mighty ocean is to them what the sacred soil of America is to Americans, or the sacred soil of England is to Englishmen, that in such a case the four pooled cable companies should rise like one man to "crush" the invader. But what more right have these leagued-together pooled cable monopolists to the mighty ocean than any other new enterprising citizens who choose to lay cables and give the world a cheaper rate? Why should fair competition be "crushed" out? Besides, this Commercial Cable Company has started its business from the outset on a fair, genuine, commercial basis. If, for instance, this company had reduced the rate from 50 cents to 10 cents or 12 cents a word, then there would be reason, indeed, to demonstrate that such a ruinous rate to all cabling only meant some ulterior design. But in reducing the messages from 50 cents to 40 cents it could only mean an honest, fair business rate, and the language used by the *Electrician* smacks of the bully, and is unjust. The *Electrician*, speaking for the cable pool, goes on to say:

"A reduction from 1s. 8d. a word to 6d. a word would, in ordinary circumstances, be suicidal, and under no conditions can it be beneficial, but as a precautionary or retaliatory measure the more drastic it is the more certain it is to be quickly over and done with."

This simply means that the Commercial Cable Company, who reduced the rate from 50 cents to 40 cents a word and refused to combine with the four pooled cable companies to raise the rate to 60 cents a word, must be "crushed" out by the most "drastic" measures; and when the crushing process is over, which is to be done quietly, then 'order will reign in Warsaw"—or, in other words, 60 cents will be the future rate. But who will guarantee that 60 cents will be the final price? Why not raise it to a dollar a word? Such a rate may reduce the revenue, but there are plenty of lambs even in England who will rush to buy the cable stock, which for a while would be inflated on such a high rate, and that may after all pay the present "crushers," who are great shareholders, much better and quicker than the slow process of legitimate earned dividends. The *Electrician*, like many other English papers who in their insular, narrow minds can only see America or judge America by the measure of the mighty dollar, has the following:

"Despite the obvious inconsistency of the thing American business men are being invited on large placards to rally round the Commercial Company to resist monopoly and sustain cheap rates. We are quite sure of their disposition to support cheap rates, and for that very reason they will patronize the sixpenny cables so long as their custom is accepted at the price."

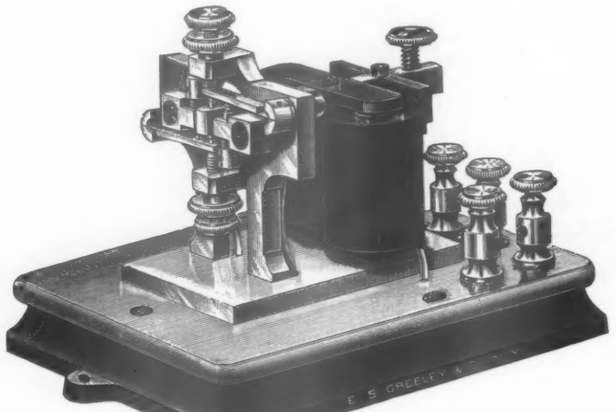

FIG. 3.—THE "VICTOR" CONTINUITY-PRESERVING POLE CHANGER FOR QUADRUPLEX SETS

I have no hesitation in saying that in spite of this cynical assurance the *Electrician* is mistaken, and that Americans who are quite wide awake to their own interest are not likely to eat, as it were, their "seed grain," and thus far we have seen only signs of rallying which the most sanguine could hardly have expected, which puts the *Electrician's* prophecy in a false position.

And now I will conclude this somewhat long letter with a few statistics which, after all, will show the real Ethiopian in the fence.

The following table will show the capitalized stock of the four pooled cable companies and their earnings during the last year 1s. 8d. or 40 cents per word.

Number of Cables.	Companies.	Capital.	Proportion in Pool, per Cent.	Revenue at 1s 8d. per Word Yearly
4 cables..	Anglo-American.....	£7,000,000	40	£280,000
2 cables	American Cable, guaranteed by Western Union.....	2,800,000	23½	130,000
1 cable...	Direct United States Cable	1,214,000	16¼	92,000
1 cable...	French Cable..	1,680,000	12¼	70,000
8 cables.	Total.....	£12,694,000	100	£572,000

Now, "from this very rock let me bring forth water." (My readers may construe the word water as they may see fit.)

In the first place it will be seen that there are eight single cables capitalized in our money at $63 470 000, which is at the average rate of $7,933,750 per each cable. In fact, the French Cable is even capitalized at $8,400,000. The earnings of all the eight pool cables were in average in 1885 as near as possible 4½ per cent. a gross. Well, then, the Commercial Company has two cables, and the given cost of these two cables as stated in the *Electrician* is just $7,000,000 for the two cables—in fact, less than half the average cost of the eight pooled cables. Therefore it is clear, if for instance the Commercial Cable only earns as much at 40 cents a word as the American Cable did in 1885, (both companies having two single cables and are therefore alike), the earnings would have been £130,000, or $650,000, which on a capital of $7,000,000 is as near as possible 9.40 per cent gross, and therefore a fair but not extravagant earning. Now, is it not outrageous that this legitimate, unwatered, and economically built Commercial Cable should be "crushed" out while earning 9.40 per cent. because it is an obstacle in the way of the eight other cables that have been capitalized at double the average cost of cables? The only solution of the eight cables is to just cut their inflated capital in two and call the £12,694,000 £6,347,000. Then all the companies, the Commercial inclusive, would start alike, and there would be a very fair return at 40 cents a word on the new capitalized stock. And as far as the stock is concerned I am quite confident it would then be sought after by conservative investors, because the now capitalized bubble cannot possibly recommend itself to the public.—*J. S. Moore, in the New York Times.*

Annual Report of the Southern New England Telephone Company.

The following is the full report of President Morris F. Tyler to the stockholders of the Southern New England Telephone Company:

The Board of Directors have the honor to submit the following as their annual report for the year closing March 31st, 1886. The treasurer's statement in the form of a balance sheet, is as follows:

Credits.

Capital stock	$1,500,000 00
Surplus	201,773 34
Contingent	378 01
Profit and loss	13,112 29
Bills payable	94,000 00
Quarterly income	65,872 36
Sundry accounts	27,946 04
Sundry income	543 00
	$1,833,625 04

Debits.

Cash	$2,721 96	
Disbursement—cash	291 34	
Franchise	525,000 00	
Treasurer, trustee	8,052 50	
Personal property	3,642 35	
Sundry expenses	54,647 75	
Unpaid earnings	4,338 84	
Supply account	12,419 55	
Sundry divisions, income	12,664 61	
Sundry divisions, plant	1,184,333 92	
Sundry accounts	25,512 22	
		$1,833,625 04

The movement of instruments during the year has been as follows:

On the first of April, 1885, we had 5,495 paying stations; on the first of April, 1886, we had 5,537—an increase of 42. To obtain this increase of 42, we have set during the year 975 stations, and we have removed 933, making a total movement of instruments during the year of 1,908, as against a similar movement of 2,328 the year preceding. A comparison of the movement of instruments for the last three years shows that the operation of the causes leading to their placing and removing is moderately regular. From the opening of the year until July the number of instruments increases. There is a dip of the curve downward in August, a rise again until October is reached, then a fall until February, and from February until the end of the year a forward tendency again. Our number is largest in July, and least in February. As this has been the uniform result for three years in succession, we think we are justified in assuming that under present conditions it is the rule.

The extra-territorial business of the year has, as during the year preceding, been our surest indication of the condition of general

business. We have adopted a uniform scale of prices for communication throughout the State, and this, as it was in some instances a slight increase, may have had some effect upon the diminution of business; but, as there has been a falling off in all classes of messages, including those which are cheaper under the uniform scale, we are inclined to think that the decrease in this part of our business is due rather to general causes than to the change in price. This is the department of our work which demands most of us in the way of improved apparatus. It is our purpose gradually, as we are able, to replace and rebuild our extra-territorial lines, using copper instead of iron wires, and thus obtain such excellence of service as will of itself largely increase its use.

It will be noticed that we have made a gain in paying stations somewhat larger than that of the preceding year at a less expense in the way of moving instruments, but the gain is so small in comparison with the total number of stations in operation as to justify the belief expressed last year, that we are in a condition of maximum development. The business has been conducted during the year upon this theory, and all expenditures, for whatever purpose, have ultimately been considered as an expense. The year has fully justified the position taken by us a year ago, that we have now reached that point where we must make our current income meet all current expenditures. As, however, we are constantly putting money into our plant by rebuilding, by supplying defective apparatus with perfected apparatus, by replacing old-fashioned construction with new construction, and by adding to some extent copper wire to existing extra-territorial lines, we have deemed it best to open an account in the nature of betterments, by which hereafter we shall be able to inform our stockholders how much of our earnings have gone to the improvement, in distinction from the maintenance or repair of our working plant.

It will be noted that the charge to plant in the summary balance sheet is some $50,000 less than it was a year ago. This is due to the fact that the lines of the company out of this State, which were included in the account last year, but which had been sold, have been credited to the account in the year's business.

The things chiefly noted in the course of the last twelve months are the readjustment of prices in certain parts of our territory, and a revision of the contract relations existing between this company and our licensor, the American Bell Telephone Company.

As was very plainly indicated in our report of last year, it has been the conviction of the directors for some time that the prices of the company were not sufficient to pay the legitimate profit which should be earned in a business of this sort. At the time of the last report we had already adopted the plan of taking no more orders for telephones, except at an advance averaging about twenty-five per cent.; but as the time went on, and the period at which the American Bell Telephone Company under its contract would be entitled to share in our net earnings approached, it became evident that this increase was not going to add sufficiently to our income to enable us to maintain the desired rate of dividends to our stockholders. We were quite aware that the past year was not a good time for increasing the cost of any necessary or convenience of business. With the dull state of trade, and the financial uncertainty hanging over the country, it was hardly to be expected that an attempted advance would meet with anything but the most determined opposition. But we were compelled to face the alternative of making a regular series of advances on old subscribers, or to stop dividends. We took the former side of the dilemma, and on the 1st of January instituted an advance in the four exchanges of New Haven, Hartford, Bridgeport and Waterbury. The telephones subject to the advance were selected after a careful record kept for a fortnight of the comparative amount of use which was made of each station. The difficulties and injustice in many instances of our present method of charging a flat price for an indefinite amount of use, have long been patent to us, and this readjustment of prices upon a crude calculation of comparative use was our first attempt to remedy them.

The advance was made cautiously and quietly. In almost every instance each subscriber whose price was advanced was personally interviewed. The whole matter was carefully explained—the condition of the company, the expense of running the business, our actual earnings, the percentage which this amount of earnings bore to the cash capital invested, and, in fact, all the elements which would enable a man to come to an opinion upon the justice of our claim for advanced rates, were laid before the subscribers; and we are glad to say that with almost entire unanimity the reasonableness of our demand for higher rates has been

FIG 2.—UNIVERSAL BATTERY—TWELVE CELLS.

FIG. 1.—UNIVERSAL BATTERY—THIRTY CELLS.

acknowledged by our subscribers, and the advance has been cheerfully paid. The proportion of those instruments which were increased in price that we have been obliged to remove on account of the advance is about one per cent. When we consider the fact that in other territory a similar attempt has been met by a loss of from fifteen to twenty-five per cent. of the instruments, we feel that we have cause to congratulate ourselves upon the result of our experiment here. This advance has not yet been extended to our entire territory, but will be applied during the current year to as large a proportion of it as the maintenance of the business will warrant. It is our calculation that when the advance is complete the result will be to raise our net earnings to $75,000 a year.

Coincident with the advance in prices, negotiations were opened with the American Bell Telephone Company to secure a modification of the terms of our contract of license. We take great pleasure in saying that we were met by the officers of the American Bell with great frankness and friendliness, and with an evident full appreciation of the causes which have led to the necessity of our making such a request. After sundry interviews it was arranged that instead of dividing the entire net earnings to all the million and a half of stock which is entitled to dividends, there should be an allowance made in favor of the holders of what is known as property stock, or stock other than what is held by the American Bell in payment for its franchise, upon the following basis: The net earnings, reckoning by years, are to be divided to the whole stock, first to the amount of three per cent. upon the entire capital. The balance of net earnings is then to be divided to the property stock to the amount of three per cent. additional. After the payment of these two dividends, any balance of net earnings that may remain is to be paid to the franchise stock of the American Bell Telephone Company, to an amount not exceeding three per cent. When both franchise and property stock have received six per cent., the balance of net earnings, if any, is to be divided equally to all the stock. This arrangement is to continue in force until the 1st of January, 1891. The result of this new contract we hope will be that we shall pay three per cent. to the American Bell upon its franchise stock, and six per cent. to the other stockholders.

The whole telephone business of the country during the past year has been very seriously disturbed, and the market value of our stocks as investment property very gravely impaired, through a series of circumstances for which neither we nor the American Bell Telephone Company are at all responsible. The fact that the fundamental patent of the American Bell Telephone Company is threatened with a revocation by a suit conducted by the United States Government has had an undue effect upon the value of our stock. Your directors deem it their duty to say to you that in their judgment the actual earning capacity of our stock is not in the least threatened by any of these proceedings.

Another cause of anxiety to holders of telephone properties has arisen in the form of legislative interference with prices. An attempt was made at the last session of the General Assembly to reduce our prices by legal enactment to $25 a year. Of course this meant bankruptcy to the company, and was too plainly unreasonable to gain very serious consideration. Since, however, some bill of this kind has been introduced into each of the last four sessions of the General Assembly, we may consider this a danger to which we will be regularly subjected. It is greatly to be desired that the public should have better and fuller information about the expense of our business. When this is done we have no idea that serious attempts to reduce our prices will be made. We must regard not only the plant which we have, but also the franchise which we hold from the American Bell, and for which we have paid, as property upon which profit must be made; and when this fact is once realized many of our difficulties will disappear.

In regard to other matters affecting the company, there has been no change in the legislation of this State since our last meeting. It is a fact, however, constantly brought to our attention, that the law of this State in regard to the right of telephone companies to maintain their plant upon the public highways, when once established there, is not in an entirely satisfactory condition. This interest has become so large and so important that it seems to us desirable that it should be placed upon a more permanent footing, and that it should not be deemed possible, as in some communities is now the case, to move our wires and poles disturb our business, inconvenience our subscribers, and put the company to considerable and unnecessary expense, by the constant change of our location by local boards. It is very probable that we shall bring this matter to the attention of the legislature in the near future. Especially in cities is it to be desired that our rights should be distinctly defined and thoroughly understood by the municipal authorities.

We take pleasure in appending to this report sundry tables of figures, showing comparative income and expenses for the years 1884–5 and 1885–6.

From these tables various conclusions can be drawn, but we would call your attention to one only, the average expense per station of our business. It is as follows:

Operating expenses	$14.44
Royalties paid the Amer. Bell...	11.27
Repairs and maintenance.	5.39
Sundry expenses.....	4 124
Total.....	$35.224

A comparison of this cost per station with the cost per station of other companies, will, I think, convince you that the business is economically conducted. In the case of other companies with the same number of stations, the cost of business runs from $40 to $50 per year.

The "Universal" Battery for Physicians and Laboratory Use.

This battery, two sizes of which are shown in this issue of the REVIEW, is the special work of Curt W. Meyer, manufacturing electrician of 357 Fourth avenue, New York. It was manufactured with the view of furnishing the medical profession a battery that should completely and satisfactorily fulfill all the present requirements for the various applications of galvanic currents in medical practice. The manufacturer claims that in this battery he has a decided improvement over the well-known Grenet cell, and that it is a clean, economical and effective battery. In this, each cell has a solid hard-rubber cap, which fits tightly over the glass jar, and various exciting fluids, such as diluted sulphuric acid, bichromate of potass solution, or bi-sulphate of mercury fluid, etc., can be used without danger to the surroundings of this cell. Each cell can be used independently. One of the special advantages is that no more cells need be brought into action than are positively required for a certain purpose.

Mr. Meyer's device (adopted since 1870 and attached on all his large galvanic batteries) for selecting any desired number of cells by means of a double-end conducting cord, comes into very useful service here, and enables the operator to increase or diminish the intensity of the current at will.

Electrical Review.

Published at 23 Park Row.
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SUBSCRIPTION

United States and Canada, $3.00 per annum, in advance. Postage paid by publisher.

Great Britain and other foreign countries, $4.00, in advance. Postage paid by publisher.

ADVERTISING.

Transient, 25 cents per line, nonpareil.

EDITORIAL ANNOUNCEMENT.

Address all communications and make all Express Money orders, P. O. orders and checks, payable to order of ELECTRICAL REVIEW, P. O. Box 3329, New York.

We invite correspondence from Electricians, Inventors and the Telegraph and Telephone fraternity and those engaged in Electric Lighting on matters pertaining to electrical and scientific subjects, and all facts of special interest in connection therewith.

We extend to manufacturers of electrical apparatus an invitation to send to this office any and all facts concerning their business which will be of interest to the public. We make no charge for publishing news.

Subscribers can at any time have the mailing address of their paper changed by sending both old and new address.

Frank M. Gilley, 54 Equitable Building, Boston, Mass., is our New England representative.

Mr. C. C. Haskins, 118 LaSalle Street, Chicago, Ill, will represent the REVIEW in the West.

Messrs. Wm. Dawson & Sons, 121 Cannon Street, London, England, are our representatives for Great Britain.

NEW YORK, MAY 29, 1886.

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The fourth regular meeting of the Electric Club will be held at the Hotel Dam next Thursday evening. Official notice will be sent to each member, who should be present and assist in arranging certain important details relating to the advancement of the club.

In reply to Dr. Talmage, who has been making faces at the newspaper reporters, Editor Dana of the *Sun* says: "The truth is that, instead of being the wretched creatures Brother Talmage represents them, the young fellows about newspaper offices are an unusually happy and lively lot. They like their work and its excitement, and, as a rule, they prefer it to any other that could be offered them. If they talk about brain exhaustion, they are only displaying a little pardonable vanity by causing it to be inferred that they are engaged in profound intellectual labors, when, perhaps, they are really expending no more brain force than is required to get up Brother Talmage's sermons. Oh, no, Brother Talmage, newspaper writers are not in a bad way for lack of sympathy, and instead of being excused for their shortcomings they should be held up harply to their duty by the public."

Hon. Roswell P. Flower has been appointed by Gov. Hill to fill the vacancy on the Board of Electrical Subway Commissioners, caused by the death of Chas. E. Loew. This selection can be questioned by no one. Mr. Flower is a gentleman of ability and character, who has the confidence of the electrical as well as the general public.

The REVIEW is pleased to see that Mr. E. H. Goff, President of the American Electric Manufacturing Company, has come off victorious in the suit brought against him by certain Canadian parties. The decision of the United States Commissioner, which is published elsewhere, is a vindication of the action of Mr. Goff in the Canadian affair.

The clouds in Indiana are not as dense as they were a while ago, either because the storm has spent its fury or the people are better prepared to look at the matter more philosophically—and the latter seems more probable. The Central Union people have devised a toll system with a graduated scale of prices ranging from a maximum five cents in direct proportion as the number of calls is augmented.

There has appeared another affidavit of the ex-Examiner of the Patent Office, Wilber by name, presented to the Congressional committee by Casey Young, secretary of the Pan-Electric Telephone Company. This document is shorn of much of its weight by the fact that its author is compelled to admit that he has in the past testified to the opposite of what he now affirms, and also from the prominence given the statement that his present "confession" is not brought about by any "undue influence"—denying in advance the evidently expected charge that his present affidavit was manufactured to order to aid the opponents of the Bell Company. The affidavit appears in full in another column.

Bishop Turner, of the African Methodist Church of Georgia, predicts that the unbalancing of the air currents which electric light and other electric currents are causing, will in a few years cause whole cities to be blown away and floods unlike any save Noah's. It would add weight to the reverend gentleman's theory, if the hurricanes and floods we have experienced had appeared in those great centers where the number of electric wires is greatest. Instead, they seem to favor small cities and open territory. One of the most delicate tests of currents of electrical action is the magnetic needle, and, if the elements were as generally stirred up by this "unbalancing" due to the various mischief-makers enumerated, we might naturally expect the compass needle to be seriously affected, not occasionally, but all the time, and the indications of a magnetic or electric storm present on call—a fact not found; and it don't seem to be very powerful for mischief in that still more delicate instrument, the telephone.

Mr. Edward N. Dickerson, a prominent New York lawyer, and one of the counsel of the American Bell Telephone Company, is not unacquainted with Wilber, the affidavit provider, at Washington. While the argument before the Secretary of the Interior was in progress, Mr. Dickerson states that "Wilber, who attended the hearing, came to me while one of the counsel for the petitioners were arguing, and said he had something of importance to say to me. I listened to him, and he then said that the Pan Electric people had offered him a large sum of money (I think $2 500 was the sum) to make another affidavit for them, but that he preferred to be employed by the Bell Company. He added that I must decide it very quickly, because he was going to take their money if I did not pay him. I waved him away with my hand and turned my back on him, and he left. I at once wrote down what he said, and showed it to Mr. Storrow, my associate, meaning to read it to the Secretary of the Interior when I made my argument; but upon reflection I concluded that the poor devil was sufficiently disgraced already without adding to it, and I refrained."

TWO LESSONS IN ELECTRIC LIGHTING.

"We are all of us learning something every day," said an old electric light man, "and I have yet to find the one man in our calling who knows it all."

The case which brought up the above remark was one in which there might at one time have been some dispute, but which today is as clearly demonstrable as any simple matter of cause and effect. An arc had formed at a connection, where instead of a twisted telegraph joint, which no amount of jar can loosen, the constructor had united the wires by means of a connector or coupling, without soldering. This connector, as is well known to all electric light people, depends upon a couple of iron screws which are forced down upon the wires, one on each.

Two results must necessarily follow, if, as is often the case—perhaps one may say usually the case—this joint is exposed to the weather.

Electrolysis sets up an action which introduces an imperfect conductor between the two metals, brass and copper or iron and copper, an oxide. This resistance means heat, and when the contact has become sufficiently imperfect and obstructive—fire.

Another fact in connection with this coupling or connector, is the unreliability of the screws. Everywhere there is constant vibration going on, and especially is this true of suspended wires. The tendency of a screw everywhere is to run "down hill" or to unscrew. Every mechanic will tell you that the most unstable thing in a mechanical shop is a screw without a jam nut. The tendency of such screws is to loosen their grip on the wire, and a loose connection means an arc.

"The incandescent people, too, have some sins to answer for," said the gentleman, and proceeded to detail a chance for mischief in an incandescent plant where the wires lie next the wall and are covered by wooden moulding. While this wall is entirely free from moisture it is perfectly safe, and an underwriter wire is good enough. Now suppose that a damp spot in the wall is in contact with one of these wires. Gradually the size of the wire is reduced by oxydation—for underwriters' wire is not water proof—and the cross section of the conductor falls below the safe carrying capacity, which means heat; and when sufficient reduction has thus taken place—a melting of the wire—an arc—fire—in tolerably rapid succession. The soft metal safety strip has nothing whatever to do with the result. The very fact that the wire is carrying less, rather than more than the normal capacity of the wire, puts the melting of the strip entirely out of the range of possibility, and it can only enact its role of protector after the arc has formed a partial contact between the two wires. Then the strip will melt, but in the meantime much mischief may have been consummated.

There are undoubtedly those who will pooh, pooh at all this as a sort of "wolf," when there is no wolf; yet both forms of danger have recently been verified by actual occurrence. The remedy in the first instance is a twisted soldered joint, and in the second a back-board beneath the moulding, or a waterproof wire along a damp portion of the circuit.

ELECTRICAL NEWS OF THE WEST.

The recent storm epidemic which covered such an area of territory East and West, has brought to the surface no inconsiderable amount of positive learning and prophetic wisdom. Since electricity has forged so well to the front in these latter days there have arisen everywhere noble hordes of electricians who dole out to us the law and gospel according to Sts. Volta and Galvani with an air of positiveness that is wonderfully refreshing, if not thoroughly convincing. The ease with which one of these latter day electrical saints turns off solutions to electrical problems and wrestles with knotty points while disregarding what have heretofore been considered essentials in the case, can only be equalled by the here-there-gone-now-presto-digit-flip movements by which the legerdemainist serves a dinner in or pulls baby clothes out of a bachelor's silk tile for the entertainment of a theatrical audience.

An editorial on these storms has brought to the front a theorist who assumes that possibly the astronomers are aiming too high and firing their telescopes at too long range to hit the cause, when they are charging this trouble to the spots on the sun—"the great electric light over 91,000,000 miles distant—" and suggests that changes in the "electric and magnetic" conditions nearer home might well be studied.

"Great electric and magnetic" changes have occurred under our own observation during the last twenty years in the stupendous increase of artificially-produced electricity; and I would like to venture the opinion that this increase of artificially-generated electricity has something to do with the alarming increase of atmospheric disturbances of an electric character. Remembering that water moisture is a powerful conductor of electricity, and that our country is one meshwork of electric wires conveying currents strong enough to kill birds which come in contact with them (?) may we not reasonably infer that the currents which may be thus diffused through a moist atmosphere are gathered up "against a day of wrath" to burst upon us in cyclonic fury? To the electric current of the telegraphic system has been added a hundredfold production for the telephone, and in like added ratio for the electric light, to say nothing of the numerous minor applications of electricity in the industrial arts.

"When the watch in your pocket becomes disturbed in its movements by any proximity to one of the great batteries; when the small wires from an inferior battery charge every molecule of barrels of water into which they are introduced, "so that they are capable of imparting a very shocking" effect upon a hand plunged into it, may we not reasonably infer a possibility of thus artificially contributing to atmospheric electricity to such a degree that the accumulative result may be a cyclone?"

To all of which an editorial critic has replied that "the theory is a very pretty one, but unfortunately it conflicts with what appears to be a fact, that there is no such thing as the manufacture of a single unit of electrical force by human agency. All that can be done by the apparatus referred to is the collection of the force from out of its grand reservoir, the earth, and its concentration for a short time before being distributed back to form a part of the general fund. It is not improbable that these processes do increase the excitation of electrical phenomena in the atmosphere on much such a scale as the steam engine increases the quantity of vapor that has to come down to the earth's surface in the shape of rain or snow. It may even be claimed * * * * that the office of this net work of wires and rails is to diffuse and distribute rather than to concentrate."

"Great minds think alike" is a proverb which is exemplified in this case by the remarks of Bishop Turner of the African Methodist Church, in a recent lecture at Shelbyville, Ky.:

"I admire the great inventions of white men, especially in controlling electricity; but the subjection of God's agent is carried too far in making it light the world. This has already changed the meteorology of our country. Look at the floods, hurricanes, cyclones, and other atmospheric disturbances taking place in the heavens and upon the earth. I predict that the unbalancing of the air currents which electric lights are causing will in a few years, if they increase in numbers as fast as in the last five years, cause whole cities to be blown away at a time, and floods unlike any save Noah's."

That settles it. The electric light enterprise has now received a blow from which it will hardly be likely to recover, unless the learned divine can be induced to retract and reform.

The most powerful currents referred to above are those of the electric light dynamos. As regards their influence, this certainly could not be very wide-spread, when we re-

member that the electric light circuit is always a metallic one, which means that the current runs round and round like the car in a circular railway, and neither takes from nor contributes to the electricity of the earth. The currents which the telephone people use are of a character which, being alternately positive and negative, constantly neutralize each other with a rapidity varying from 16 to 40,000 or so per second, and it hardly seems as if these currents, which arise from a single cell, could do a great deal in the way of getting up cyclones. The remaining revolutionary electrical factor is the battery current of the telegraph people, which is dipped out of the earth, as it were, in Chicago and emptied at the back door of the New York office, or flows similarly between any two terminal offices in the country; while on two parallel lines of opposition companies these may just as likely as not run in opposite directions, and thus each neutralize the mischief-making properties of the other.

The Richmond., Ind., people seem to have received the toll system with quite general favor. and, what is quite convincing in that direction, is the fact that the local press there use no profane adjectives in speaking of the Central Union. This is indicative of an inclination in the right direction. As the market reporters say, "A better feeling exists in (this) Union."

Somewhere out in Utah there is what somebody calls an Alecktrician, who has latterly graduated from the quiet and innocent occupation of a sheep herder, and felt that he was called to the front rank of scientists through a sort of providential interference in his worldly affairs. It will be remembered that Utah is a country of dispensations and miracles, and mysterious deviltry generally.

This scientific shepherd has discovered upon his ranch, or farm, or what not, a bed of mineral wax. This material commenced its humble career as a substitute for shoe blacking; it was by-and-by found to be good sealing wax; then it became available for street paving; and now, at the top of the ladder of usefulness, it has become an insulator, with those rare and valuable properties, according to the learned wool-gatherer, of insulating against both magnetism and induction. Preparations have been made for testing these properties by putting electric light, telegraph and telephone wires into a conduit made of this material, thickened with sand and moulded into a tube. "Great Expectations" are the discoverer's.

The Van Depoele Electric Manufacturing Co. have contracted with the Winona Electric Light Co. for an incandescent plant of 600 16 candle-power lamps, and a number of large lamps. The gas at Winona is said to be of a kind that bears improving upon.

The street railway people at Montgomery, Ala., have decided the matter, and the contract has been signed under which the entire street railway system of the company will be equipped and run by the Van Depoele system, and have changed the name of their organization to the "Capital City Electric Street Railway," in their glee the results which have been attained by the Van Depoele Company's motors and the system which this company has introduced there.

The Van Depoele people have also contracted for the construction, and they are prosecuting the work with vigor, of an electric railway at Windsor, Ont., which it is hoped will do service on the Queen's birthday, the 24th inst.

Theodore P. Bailey, of the Thomson-Houston Co., lately contracted for an addition to the Wichita, Kansas, plant in the shape of a 30-light dynamo, which will make the total number of lights ninety, and at Dodge City, in the same State, sold an incandescent plant of 250 lights.

Mr. J. H. Reid, representing the New York Insulated Wire Co., has opened an office at 75 East Madison street, this city, and will be pleased to have his old-time friends call on him there.

The Brush Electric Co., represented by Mr. Alexander Kempt, special agent, have removed from their former location in the old Board of Trade, to 130 Washington street, nearly in the rear across the court from the former building.

It is flattering to a correspondent to have his ideas copied, but if there is any one thing which confirms him in the belief that his head is truly "flat on top," it is to have his assertions endorsed by subsequent events. Modesty forbids particular mention, but the onus of the suit against the Bell patents, as shown up by the testimony of late witnesses, is so exactly in accordance with predictions published in these columns when the bubble was first blown, that confession is here made to some slight feeling of gratification in the premises.

Webb Chandler, agent of the Gamewell Fire Alarm Telegraph Co., has convinced the authorities of Chattanooga, Tenn., and will put in the Gamewell system at that place.

The arc light hanger illustrated in the REVIEW a few weeks since, has been made the subject of an improvement, or, rather, an addition, in the shape of a limiting chain connecting the two rods, so as effectually prevent all possibility of accident through careless handling of the crane when lowering or raising the lamp. As at first made, there was a possibility of the lamp coming down "by the run," as Jack Tar has it, but this is effectually prevented in the improved form of hanger. The Electrical Supply Co., report a widespread interest in and demand for the Haskin's hanger.

Col. S. G. Lynch, broker, at 146 La Salle street, gives the following values of telephone stocks:

Chicago	$350 @	$360
Central Union	40 @	45
Michigan	64 @	66
Iowa Union	15 @	18
Great Southern	25 @	27
Great Southern, Script, 90 cents on the dollar.		
Colorado	18 @	20
Rocky Mountain Bell	40 @	45
Missouri and Kansas	53 @	55
Missouri and Kansas, Script, 53 cents on the dollar.		
United	15 @	17
Cumberland	65 @	70
Wisconsin	107 @	109
Bell of Missouri	147 @	150

CHICAGO, May 24, 1886.

BOSTON ELECTRICAL NEWS.

The committee on horse railroads of the Massachusetts legislature have returned. They are thoroughly convinced of the possibilities of electricity as a motive power for surface and elevated roads. The Enos system was very attractive. The nearness to the ground, the readiness in starting and stopping, the total absence of all vibration were found to be features peculiar to this system. The motion of the car is said to be easier than that of a sailboat, without the least rolling or swaying. The committee also witnessed a trial of the electric motors on the elevated in New York, and were much pleased with the results attained. Perhaps the members thought of the elevator in the State House, for it is slower than the movement in this section to adopt new ideas. The members of the third house speak confidently of a charter for an elevated road in 1887.

"If wishes were horses"—well, if enactments were accomplishments we might have everything we desire without cost. The attempt to fix telephone rentals failed. Public sentiment is growing stronger against legislative interference in such matter. It would be easier to carry into execution a law prohibiting tautology and verbosity in the general court as to attempt to regulate the cost of the necessary conveniences of life.

Horace (not the go-West, etc.), once said in verse that no man was contented with his lot, but he his business what he willed, he no sooner reached it than he longed for another vocation. As I was looking at some of the old literature of two thousand years ago, I found the records of a town not elsewhere mentioned in history, Hypochthonion, in the County of Katageion. The climate was so mild that frosts seldom occurred. The inhabitants were intellectual — many a century ahead of their times. They had novel methods of communication with one another—strings stretched in tubes under the surface of the street, in tubes made of the hollow trunks of trees. As time went on, the number of strings so increased the streets were often impassable for chariots. At last a meeting of the people was called in the market place to vote upon the question of placing the strings on *doratia* (spears) set in the ground. The motion prevailed, and in a year the change was made, greatly to the satisfaction of all, and the Allontopoles who proposed the change was elevated to the position of Lord High Commissioner on Overhead Strings.

Among the wonders that attract the attention of the scientific public is that of the Gray dynamo electric machine. It is claimed that tests have shown that this machine gives enough current for six 2,000-candle-power lamps for one mechanical horse-power. It is the intention of the inventor to utilize this current in suitably constructed electric motors, and thereby to obtain four to five horse-power from the motors to one horse-power used in driving the dynamo. A portion of the power generated by the motors is utilized in driving the dynamo, it being only necessary to start the dynamo at first by some outside force. It is expected that this system will be applied to the moving of trains, steamboats, etc.

A girl on a Sound steamer, returning from New York for the first time, noticing the numerous positions of the incandescent lamps, exclaimed: "That's the first time I ever saw kerosene burning upside down."

The Thomson-Houston Electric Light Co., of Springfield, are placing 250 incandescent lamps in multiple series for lighting the park for the 250th anniversary of the settlement of the city. Two churches and a large hall are now lighted by incandescent lamps on multiple series distributors.

A very amusing incident occurred a few days ago at one of the large mills in New England, of interest to a certain party of prominent electric light men who, judging from their corporeal looks, "ne'er had known the want of cooks," which consisted of very important tests of the relative power required to run the dynamos of their respective systems. They were sitting quietly in one corner of the room anxiously awaiting results to be given by the party testing the machine, whose authority is undoubted in any of the mills in the New England States, when suddenly, as weight after weight was placed on the dynamometer, to the surprise of all present one of the parties concerned exhibited his agility, and with a strong emphatic exclamation and a look of intense disgust, exclaimed, "Save me, Hercules, he's got every weight on my machine!" For a computation would have established the fact that the machine was taking two horse-power to run an arc lamp while it had previously been stated that it required five per cent. less power than any other machine. He departed with apparently the weights transferred from his machine to his heart. So much was the dynamometer strained, that all at once the whole machinery came to a standstill from a hot journal.

A remarkable test was made at the office of the Brush Electric Light Company, of Boston, recently, with the Slattery cut-out for incandescent lamps in multiple series. The circuit had an E.M.F. of 3,000 volts. The distributor was attached to two multiples of eight lamps each. On turning on or off the ninth lamp (*i.e.* the first of the second multiple) an automatic switch throws the second set of lamps in or out of series. The inventor removed a lamp and broke the connection of the bare wires without receiving the slightest shock. Mr. Frank Ridlon also made the same test, and remarked the total absence of shock, although the circuit had as high a potential as is ever used.

The New England Telegraph and Telephone Companies are stringing a second copper wire from Boston to Worcester, as there is more business than the first wire can accommodate. The copper wire now used for all long distance work is No. 14, 100 pounds to the mile, and equal to a No. 6 iron wire, 590 pounds to mile. The wire for short distances is iron No. 10, 260 pounds to mile.

The Jarvis Engineering Company have sold a second 60 horse-power Armington & Sims Engine to the Brookline Electric Light Company. This very successful company use the Jarvis setting, and burn coke screenings for fuel. The town has renewed its contract with the company for street lighting, and has increased the number of lights. The station will soon have a capacity for 150 arcs.

It has recently been discovered that copper at low temperatures has little or no resistance. It is now proposed to submit the armature of a dynamo to a current of air at least 200 degrees below zero. The resistance of the armature will be so materially reduced that ten times as much current can be taken from the machine. The armature being kept so cool it is impossible for it to burn out.

The electricity generated by friction, which is troublesome in many mills, can be taken care of and turned to advantage by the following method: Brass knobs collect the electricity from the belts, and in connection with enormous Leyden jars discharge the current to earth through a long, fine and well insulated coil of wire, which is the primary of an induction coil. The secondary is of thick wire, and a current of low potential from it can be used in any of the applications of electricity.

The Jarvis Engineering Company, of Boston, have sold a steam plant to the Manchester Gas Company, Manchester, N. H., consisting of a 60 horse-power Armington & Sims Engine, tubular boiler with Jarvis setting to burn coke screenings, Korting injectors, National heaters. The system to be used is the Thomson-Houston.

TELEPHONE STOCKS.

	Bid.	Asked.
Am. Bell Telephone	157	158
New England Telephone	34½	34¾
Erie Telephone	25¾	
Mexican Telephone	1	
Tropical Telephone	¾	

BOSTON, Mass., May 26.

Sophronia—No, the electric light does not spoil the complexion. The objection is that it shows up complexions that have been spoiled.

Wilber, ex-examiner, is now afflicted with an "active conscience." When one attempts to make his various telephone statements agree, the conclusion unavoidably reached is that he has not been an "inactive" liar.

The *Canadian Missionary* is one of our discriminating exchanges. In its last issue it says: "The ELECTRICAL REVIEW, 23 Park Row, New York, subscription $3, is one of the papers demanded by the times. It is bristling with electricity. Motors and dynamos are its staple food, and the telephone throbs in continuous vibrations against the diaphragm of its pages. You will, however, be entertained not shocked by its columns.."

Telephonic News

⁂ Should telephone appliances come under the head of Hollo ware?—*Boston Bulletin.*

⁂ The Senate of this State passed Mr. Rielly's bill fixing telephone charges in New York and Brooklyn at not over $5.00 per month, but it failed to reach the House before adjournment.

⁂ An Elmira journal waxes wroth against the telephone company for charging for a telephone in the office of the City Clerk, and urges the aldermen to "make this corporation come to time," whatever that means.

⁂ In Bristol, England, the housekeeper of a large residence hearing burglars in the building telephoned to "Central" to that effect, and two officers promptly arrived, and the burglar got three months. Now is a good time to subscribe for a telephone.

⁂ It is true that at Liverpool, by telephonic aid, last Wednesday evening the Queen heard "Les Cloches de Corneville." "But fancy," said a sexagenarian clubbist last night, "anyone hearing its choruses without seeing the fair choristers and what is called their costumes! Awful! awful!"

⁂ Several weeks ago the REVIEW stated that the Metropolitan Telephone and Telegraph Company had purchased a site on Cortlandt street, and would erect a large building for their use. Plans have now been entered by Vice-President Heidekoper for an eight-story building to be erected at Nos. 16 to 20 Cortlandt street, at an estimated cost of $200,000. The structure will be of brick and iron, and cover land 72.2 feet front and rear by 112.6 feet deep. The lower story will be used for stores and the upper floors for the offices.

⁂ Thursday afternoon the Massachusetts House passed, to be engrossed, the bill which provides that no telephone company shall hold more than 30 per cent. of the stock of any other telephone company. Under suspension of the rules an amendment was offered to strike out the words, "doing business in this State." Thus telephone companies chartered in this State would be prohibited from holding more than 30 per cent. of the stock of other telephone companies doing business in this State or in any other State. Mr. Fay said that this amendment was a new one, and he would like time to consider it. He therefore moved to postpone the bill to Monday. There was some disposition to press the matter to a vote at once, but Mr. Tobin, who offered the amendment, said he was willing to have the matter go over, and the House so assigned it.

⁂ A. F. McGrew, manager of the San Francisco Underground Telegraph Company, who was one of the committee appointed by the Board of Supervisors to examine and report on the proposition of the San Francisco Underground Telephone Company, has filed his report with the Board. He opposes entirely the views taken by Messrs. Ladd and Sabin, the other two members of the appointed committee, and which were published in the last issue of the REVIEW. Mr. McGrew urges that the matter be taken into consideration by the Board as soon as possible, asserting that underground conduits have long since passed out of the experimental stage, and proved perfectly practicable. The figures of New York electricians are given, claiming that New York has 300 miles of underground wires; Philadelphia, 348 miles; Chicago, 265 miles, besides 50 miles of electric light wires all underground. Mr McGrew maintains that hermetically sealed conduits, except for trunk lines, are impracticable, and that the only desideratum is that the wires be so laid as to permit access to each individually, without disturbing the whole system. Should this request for a franchise be granted to his company, he offers to prove the practicability of his system at once.

⁂ The $5.00 per month telephone bill for the cities of New York and Brooklyn got left. It was in the Assembly committee in company with a number of others on the same subject.

⁂ Mr. Beecher Marvin, manager of the telephone exchange at Lockport, N. Y., is said to be the young man for whom Miss Folsom, who is to marry the President, first formed an attachment. He is a handsome young man, as most telephone managers are.

⁂ The Italian Government is favoring the telephone industry in a remarkable manner. It has just authorized the erection of a telephone system in the parish of Cornigliano, a small village in the neighborhood of Genoa, which will be connected with Sanpierdarena and another adjacent parish, the first instance in that country of three villages being connected by telephone.

⁂ An officer of the Kansas City Telephone Company gives a concise and graphic account of the recent terrible storm in that city in a letter to us, as follows: "It was a little ahead of any former experience of mine. The wind and rain in great sheets rushed, roared and howled among our lines and aerial cables through narrow Sixth street as if demons by the thousand were in contention. Our young ladies twenty-five in number, were escorted to the banking room on the first floor, where they remained until the storm had passed. The skylights over the stairway were crushed in, and you can imagine our feelings as we heard the crash. Our damage was less than I expected. The work of getting all to rights has been tedious, but we are again good as new. You can estimate the force of the wind when I tell you six of our fifties on Broadway, between Ninth and Seventh, were broken off close to the ground."

Southwestern Telephone News.

Editors Electrical Review:

Everything in the telephone line is quiet in this section, excepting that we have a very bad case of opposition. Last November first was the sixth birthday of the Little Rock Exchange, and it was also the opening day of the opposition or Southern Telephone Company. This is a sub-company of the Washington, and an off-shoot of the Pan-Electric, using Rodgers & Long patents.

Little Rock is Garland's home, and the new company started with a grand rush. They cut rates from $5.00 and $4.00 to $3.50 and $3.00 per month, for business and residence connections respectively. Promised "better instruments and better service," or anything else the subscriber wanted, and was going to "run the Erie Company out of town" at once. Six months have passed away and they have failed to make a single promise good.

In spite of the statement of their representative at Indianapolis some time back, that "they had run the Bell Company entirely out of Little Rock, and now had the field to themselves, and were giving a much better service than the old company did," we are still here, with over 300 telephones in constant use, keep the same number of operators, charge the same rates, and do quite as much business as before they started. As for service, there is no comparison. The Southern don't give any. According to the evidence of those who try to use their instrument: "They are great promotors of 'cussing,' and equal to dumb-bells for exercise. You can grind until you get an appetite, but its quite an accident if you get central, and ten to one you can't talk when you do get them."

Indianapolis parties might get some pointers by writing some of Little Rock's merchants in reference to the "beauties and advantages" of rival telephone companies. Wonder if the men of that enterprising place, who exhibit so much knowledge regarding the telephone and are so anxious to find one as different as possible from the Bell type, ever stopped to think that the telephones controlled by the Bell Company are the only ones that have ever given satisfactory results in actual service, and that rival ones have failed in exact proportion as they have departed from the Bell patterns. "Monkeying" with new and untried systems will cost more in the end than the prices of the "great monopoly," which, say what you will, gives full returns for all it charges.

Yours, A. F. A.

Little Rock, Ark., May 18.

More Pan-Electric Testimony—Wilber's New Fish Story—Also Prof. Bell's Statement.

In the testimony heard by the Congressional Committee last Friday was a new affidavit of Zenas Fisk Wilber, whose previous affidavits on both sides of the telephone controversy adorn the pages of the Interior Department record. The affidavit is as follows, was presented by Casey Young, secretary of Pan-Electric Co., and is printed for what it is worth, as showing the extremes to which the opposition is put in its endeavors to down the Bell Company:

City of Washington, District of Columbia, ss:

Zenas Fisk Wilber, being duly sworn, deposes and says: I am the same Zenas Fisk Wilber, who was the principal Examiner in the United States Patent Offices, in charge of a division embracing all applicants for patents relating to electrical inventions during the years 1875, 1876, and till May 1, 1877, about which latter date I was promoted to be Examiner of Interferences; that as such Examiner the application of Alexander Graham Bell, upon which was granted to him letters patent of the United States, No. 174,465, dated March 7, 1876, for "Multiple Telegraphy," was referred to me, and was by me personally examined and passed to issue. And I am the same Zenas Fisk Wilber who has given affidavits in the telephone controversy, commonly called the "Bell Controversy," in which a bill has been filed and suit brought in the Southern District of Ohio, by the United States, for the voidance of letters patents No. 174,465, issued March 7, 1876, and No. 186,787, issued January 30, 1877, both to Alexander Graham Bell, which affidavits, so given by me, were used at the hearing before the commission in the Interior Department, consisting of Secre ary Lamar, Assistant Secretaries Muldrow and Jenks and Commissioner of Patents Montgomery, which commission sat for the purpose of advising the Department of Justice as to the advisability and propriety of the General Government bringing the suit supra. In none of such affidavits heretofore made by me, and referred to in this affidavit, have the exact facts and the entire truth been told by me in relation to the circumstances connected with the issuance of the said patent No. 174,465. These affidavits were made by me under circumstances which I propose to relate herein, and obtained from me to serve the ends and purposes of the parties who influenced me

In order that parties may be vindicated and injustice rectified I have concluded to tell the whole truth and nothing but the truth. It will be impossible for the courts of the country to mete out exact justice without a knowledge of the influences brought to bear upon me while examiner in the Patent Office in 1875, 1876, and 1877, which caused me to show Prof. Bell, Elisha Gray's caveat, then under my charge and control as by law provided, and which caused me to favor Bell in various ways in acting on several applications for patents by him made. This conclusion has not come upon me suddenly, but after due and deliberate consideration and after having carefully weighed the consequences which must result from this disclosure. I am fully aware that it may place me in an awkward position with some of my friends, and, possibly, before the public, that it may even alienate some of my friends from me. Nevertheless, I have concluded to do as above stated, regardless of consequences without the hope or promise of reward or favor on the one hand, and without fear of results on the other hand.

The affidavits hereinbefore referred to were executed July 30 and August 3, 1885 (these being duplicates), October 10, 1885, November 7, 1885, and October 21, 1885. One of these affidavits, viz., the one of October 21, 1885, given at request of the Bell Company by Mr. Swan, of its counsel, was given when I was afflicted with and suffering from alcoholism, and was obtained from me when I was so suffering, and after it had been so obtained from me I was vilified and attacked before the commission referred to. Under such conditions my faculties were not in their normal condition, and I was, in effect, duped to sign it—not fully realizing then, as I do now, the statements therein contained. I had been drinking and was mentally depressed, nervous, and not in a fit condition for so important a matter. As stated, I did not realize (I could not in my then condition) the effect or scope of the affidavit, the data for which were supplied by Mr. Swan, who paid me $100 therefor, for the Bell Company. In this instance, and at this time, I am entirely and absolutely free from any alcoholic taint whatever; I am perfectly sober and a conscious master of myself, mentally and physically. This affidavit is, consequently the outcome of a changed mode of life and a desire on my part to aid in righting a great wrong done to an innocent man. I am convinced that by my action while Examiner of Patents Elisha Gray was deprived of proper opportunity to establish his right to the invention of the telephone, and I now propose to tell how it was done.

The attorneys for Prof. Bell in the matter of the application, which became patent No. 174,465, were Messrs. Pollock & Bailey, then a leading firm of patent practitioners in Washington city (since dissolved, and each in business for himself). Major Bailey, of that firm, had the active management of the case, and several times appeared before me during its pendency in relation thereto. Major Bailey and I had then been acquainted for almost 13 years; we had for a time been officers in the same regiment, and staff officers upon the staff of the same brigade commander. Upon my appointment to the Patent Office in 1870, our old acquaintance was renewed, and for years we were exceedingly friendly, and still are, even to this day. I was poor when I became Examiner, and consequently was in constant and great straits for the lack of ready money; in such straits I had several times borrowed money from Major Bailey, notwithstanding the fact that Commissioner Leggett had in 1871 or 1872 issued an order prohibiting employes of the Patent Office from borrowing in any way or under any subterfuge from attorneys practicing before the officers or from inventors, which order was then and is still in force. I was, consequently, in debt to Major Bailey at the time the application of Bell was filed in the office; in addition, I was under obligations to him for a present to my wife—a very handsome and expensive hunting-case lady's watch, which I understood he procured from George P. Reed & Co., of Boston, Mass. I consequently felt under many and lasting obligations to him, and necessarily felt like requiting him, in some degree at least, by favoring him in his practice whenever and however I could. As I recollect, I borrowed $100 from him about the time the Bell application was filed. He was known as a liberal man, and gave expensive presents, and loaned money to others in the office. Feeling thus in his power from the obligations noted, surrounded by such environments, I was called upon to act officially upon the application of Alexander Graham Bell.

When I suspended Bell's application, because of the Gray caveat, I did not, in the official letter to Bell, give the name of the caveator nor his date of filing. Major Bailey appearing before me in regard to such suspension, I allowed him to become acquainted with both facts, telling him personally the same, so that he immediately knew the exact facts upon which to base the protest he subsequently filed against such suspension, and which was referred by me to the Commissioner in person for instruction. The Commissioner directed me to investigate, and determine, if possible, which (the application of Bell or the caveat of Gray) was filed the earlier on February 14, 1876, and to be governed by such finding of fact as to the maintenance or dissolution of such suspension. From the circumstances hereinbefore detailed, I was anxious to please Major Bailey—keep on the best and most friendly of terms with him, and hence was desirous of finding that the Bell application was the earlier filed, and I did not make as thorough an examination as I should have done in justice to all concerned. So, when I found in

the "cash blotter" the entry of the receipt of Bell's fee ahead of the entry of the receipt of Gray's fee I closed the examination and determined that Bell was the earlier, whereas I should have called for proof from both Bell and Gray and have investigated in other directions, instead of being controlled by the entries alluded to and the statements of Major Bailey to me. The effect of this was to throw Gray out of court without his having had an opportunity to be heard or of having his rights protected, and the issuance of the patent hurriedly and in advance of its turn to Bell. Immediately thereafter I again borrowed some money from Major Bailey, which has never been repaid; we have never had a settlement, and for years I was constantly in debt to him and still am. He has as yet demanded no settlement or repayment from me.

After the suspension of Bell's application had been revoked, Prof. Bell called upon me, in person, at the office, and I showed him the original drawing of Gray's caveat, and fully explained Gray's method of transmitting and receiving. Prof. Bell was with me quite a time on this occasion—probably upward of an hour—when I showed him the drawing and explained Gray's methods to him. This visit was either the next day or the second day after the revocation of the suspension. There were several clerks and assistants in the room at the time, who might have heard the conversation when I showed Prof. Bell the drawing and verbally explained to him the methods of Prof. Gray. Bell had been in the office before this, on several occasions, in relation to other cases, so we were then acquainted; on this visit he was alone, and the visit occurred in the forenoon. About 2 P.M. of the same day he (Bell) returned to the office for a short time. On his leaving I accompanied him into the hall and around the corner into a cross hall leading into the courtyard, where Prof. Bell presented me with a one-hundred-dollar bill. I am fully aware that this statement will be denied by Prof. Bell, and that probably the statements I have made as to my relations with Major Bailey and his influence will be denied, but, nevertheless, they are true, and they are stated, subscribed, and sworn to by me while my mind is clear and my conscience active and bent on rectifying as far as possible any wrong I may have done. Gray's caveat was a secret, confidential document under the law, and I should not have been influenced to divulge the same; but I did so as hereinbefore related. Upon the following page I make a diagram of the room. (No. 118), the hall, and the cross hall where Prof. Bell handed me the one-hundred-dollar bill.

The assistants and clerks had free access to the archives and records in the room; they could go in and out, outside of regular office hours; the caveat was for some weeks in a file box on my desk and could have been taken therefrom and from the office, and kept over night without my knowledge, either by a messenger, a watchman, a clerk, or an assistant, or by a clerk or assistant from other divisions; at that time Examiners' rooms were not locked and the key kept at the desk of the Captain of the Watch, when the rooms were not occupied, outside of office hours, as is now the case; nor were passes then required for employes to enter the building outside of regular office hours.

Prof. Bell, in his testimony in the Dowd case, admits having had a conversation with me in relation to the caveat, but says, as I remember it, that I declined to show him the caveat, which is not true. I did show him the original drawing as hereinbefore stated.

In corroboration of the fact stated herein that Major Bailey had an influence over me, I desire to refer to several other applications of Prof. Bell's, which were acted on and became patents in remarkably quick order, as will be shown by the records of the Patent Office. The application for this patent, 174,465 was filed February 14, 1876, became a patent (after the several actions thereon) March 7, 1876; for No. 161,799, filed March 6, patented April 6, 1876; for No. 181,553, filed August 12, patented August 29, 1876; for No. 186,187, filed January 15, patented January 30, 1877; for No. 178,399, filed April 6, suspended May 18, 1876, on account of a possible interference with another pending application of Prof. Gray, was amended, and protest against interference filed May 20, suspension revoked, case passed to issue May 29, and patented June 6, 1876. Such rapid progress from applications to patents are exceptional, and few such instances, if any, can be found outside of Bell's cases.

For the sake of justice, the easement of my own conscience, and to place myself right in this matter, I have concluded to tell the whole truth thereabouts, in so far as I had any connection therewith in an official capacity; and this without any regard to whom it may aid, help, or hurt; and I have thus concluded after full, frank consultation and conversation with my old college mate, comrade-in-arms, and long-tried friend, Major Marion D. Van Horn; and I shall intrust this document to him, hoping and trusting that I may yet be able to repair in some degree the wrong done, and I stand ready, and shall always be ready and willing, to verify this statement before any court or proper tribunal in the land.

ZENAS FISK WILBER.

{Seal of Notary.} Sworn to and subscribed before me this 8th day of April, 1886. THOMAS W. SORAN, Notary Public.

The Attorney-General was the next witness called. His attention was called to Mr. Briesen's testimony, and he said there were two or three mistakes in Briesen's account of the interview at the Department of Justice. He (the Attorney-General) had not expressed any opinion as to the proper mode of treating Van Benthuysen's applications. When Mr. Briesen asked leave to withdraw Van Benthuysen's application, witness had told him that he had no jurisdiction—that the paper had gone out of his office. Witness had not made any remark in reference to what would become of an application filed in the office afterward. Witness was positive about that. He had purposely and premiditatedly remained silent on that point. Outrageous as it may have seemed, he would rather have acted in the matter himself than have made any remark on the proper mode of making the application, and if he was positive about anything it was on that point.

Mr. Oates said that it had been alleged and published that witness had visited Mr. Young's rooms on G st. while the conference was in progress.

Mr. Garland replied that he had never been in those rooms, and did not know until he had seen it in the newspapers that Mr. Young had rooms on G st. He wished to repeat his former statement he did not believe that he had attended a Pan-Electric meeting after the Presidential election of 1884, and was positive that he had never attended one after the inauguration.

Mr. Oates inquired if any person had intimated to witness that an application for suit would be made and that witness had intimated that it would be opportune if made during his absence.

The witness positively declared that there had been no such intimations.

Mr. Ranney read from Mr. Briesen's account of his interview with the Attorney-General, who smiled at certain points in the reading.

"What did those four men want?" inquired Mr. Ranney, referring to the visit of Briesen and the others to the Department.

"I have stated about thirteen times," said Mr. Garland, "but will state it again if you wish. What they really wanted, I don't know; what they said they wanted was We want the name of the United States to test the Bell Telephone patent.' I remarked in reply, that I could not consider the application, that I was a stockholder and attorney for a rival company. Then there was a question or two about the procedure. I don't remember what they were. I was determined to cut the matter off, and I may have been a little abrupt, I am afraid."

The witness said that he wished to say a word about that part of the testimony of "Colonel Dana, of the New York *Sun*," where, in answer to Mr. Millard's question, he had said that if he (Mr. Dana) had been in Mr. Garland's place he would have protected his Department against this suit; that he would have smashed it. While he cared little about the matter, he might say a word in reply. It had been conceded on all sides that he had no proper authority to act in the matter because of being a stockholder in a rival company, and his relationship to the country had not changed in his absence from July to October when he found the action had been taken. The same disability existed as when he had declined to act in the first instance. If that same disability existed then he put the question to 'Colonel Dana" and the committee how he could have smashed the suit if he did not have the ability to institute it.

The Chairman—Your view was that you had no power to interfere at all?

Witness—Not at all; I had not been denuded of my disability.

Mr. Ranney discussed with the witness at some length his power in such matters and the legal phase of the case.

Dr. Rogers took the stand and gave some entertaining but unimportant testimony. The Rogers stock had been offered to only fifteen out of 400 members of Congress, and only fiveor six had received it.

Professor Alexander Graham Bell says that there is not a particle of truth in the story that he paid to Zenas Fisk Wilber, while the latter was an examiner in the Patent Office, the sum of $100 for information contained in the caveat of Professor Elisha Gray. Professor Bell said in an interview:

"I have only seen Mr. Wilber two or three times in my life. The first was when he was a patent examiner in the Patent Office at about the time when the Bell patent came out, but after the caveat had been settled. The second time was about two years ago in New York. We met on the street and he claimed acquaintance. I did not recognize him and he introduced himself as Mr. Wilber. Even then I did not know who he was, and he then said that he was a patent examiner when our patent came out. I then said I was glad to see him. But as for the statement that I ever paid him a cent or offered to pay him anything at any time, it is not true; neither do I know of anyone else paying him anything. I know at the time the Bell patent was issued I would have been glad to have had $100 in my possession. I have never seen Mr. Wilber, never had any communication with him, and had never heard of him until recently in connection with these conflicting affidavits. There is not a shadow of foundation for the story. Of course I am not in a position to answer for the rest of the company, but I know that any such accusation applying to any officer of the Bell Telephone Company in Washington is equally false. They must be on their last legs to get up such a story as that."

With a single dissenting voice, that of Mr. Hall, of Iowa, the Pan-Electric Committee decided that so far as Fisk Wilber's testimony is concerned the committee will rest content with the five affidavits he contributed prior to the recommendation of Secretary Lamar in favor of a Government suit, although it is understood that Mr. Ranney would have been willing to admit the new testimony for the sake of an opportunity to examine the witness.

It is not expected that the report will contain any recommendations, and it may not formulate any conclusions, but simply state the facts as shown by the testimony. The record is rather voluminous, and the preparation of a report may consume several weeks. The Pan-Electric people are angry and disappointed on account of the refusal of the committee to admit the testimony of Wilber and other witnesses.

*** Says a Ft. Wayne, Ind., exchange: To assert that the telephone company is anxious for an exchange to rescind their order to rescind their order to remove instruments, is premature, if not altogether untrue. It may be that a satisfactory arrangement may be had between the patrons and the company, whereby the service may be continued; but to say that such a fact is already accomplished, is very wide of the truth.

TELEGRAPHIC

.... It now takes but six minutes to send a cable message to London and get an answer, but it still takes an office boy something over two hours to go around the corner and return with a plumber.

.... The Baltimore and Ohio Telegraph Company are about to parallel the Southern Telegraph Company's lines, now working under an arrangement with Western Union. Route will be from Washington, D. C., to Montgomery, Ala., and to New Orleans, making connection with the principal Southern cities.

.... The Brooklyn Electric Time Company, 16 Court street, Brooklyn, operating under Julian E. Carey's patents, are daily dropping a time ball at noon on the store of Weschler & Abram, that city. They have also installed their clocks in all stations of the Brooklyn Elevated Railroad. Mr. W. A. Belcher is their superintendent.

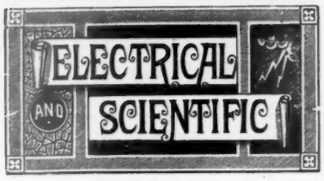
.... The firm of D. H. Dorsett & Co., are constructing a large conduit factory, on East river, extending from Twentieth to Twenty-first street. This will be a duplicate of their extensive Chicago factory. This firm, which is composed of D. H. Dorsett and J. R. Burdick, of Chicago, has recently signed a contract with a local underground service company of St. Louis to put in twenty miles of the Dorsett conduit for electric wires.

... Accounts have just been published of the successful laying of a cable from Yorke's Peninsula to Althorpe's Island, South Australia. It is stated that the new cable will not be of great commercial value, although it will be of service in apprising the public of the shipping traffic between the two gulfs. The cable is eight miles in length, about two inches in diameter, and armored with ten thick galvanized wires, each three tenths of an inch in diameter.

.... The annual election of the Standard Underground Cable Company was held on the 22d, and the following Board of Directors elected: Geo. Westinghouse, Jr., of the Westinghouse Air Brake Company; Robt. Pitcairn, of the Pennsylvania Railroad Company; C. H. Jackson, of the Union Switch and Signal Company; John H. Dalzell, Treasurer Chartiers Valley Gas Company; M. W. Watson, President Exchange National Bank, Pittsburgh; O. T. Waring, of the Standard Oil Company; and R. S. Waring, Vice-President of the Company.

.... The Baltimore and Ohio Telegraph Company's new Northwestern extensions are reported almost ready for business. The lines over the Wisconsin Central Railroad's route, and extending to Chicago and St. Paul and Minneapolis, are said to be already practically ready for operation. St Paul and Chicago grain brokers have leased several private wires. The new Mackay telegraph lines between the same points are stretched along the highways, instead of over the railroad route, and reach all the chief cities of Wisconsin, northern Illinois and eastern Minnesota. They are expected to be in readiness for taking business by June 1.

.... Justice Stafford, of San Francisco, decided a case of importance to telegraph companies and to persons sending dispatches over their lines. The case was that of S. Brunswick *vs.* The Western Union Telegraph Company, brought for damages amounting to $176, alleged to have been incurred by reason of the failure of the defendant to transmit or deliver a certain telegram. The dispatch was proved to have been written on an ordinary telegraphic blank containing a stipulation limiting the amount of the company's liability to the amount paid by the sender, unless the message was repeated. In this case the message was sent C. O. D. There was no evidence of the message having been repeated, nor of willful misconduct or gross negligence on the part of the company, and the court rendered judgment in favor of the company with costs.



* * A petrified clock has been found in Rome. Another indication of hard times.

* * The locomotives of the Mt. Vernon and Pan-Handle Railway, Ohio, are all equipped with the electric headlight.

* * Miss Emma Abbott and Miss Bellina, of the Abbott Opera Company, sang into the transmitters at a recent telephonic test in Cleveland to the evident satisfaction of the parties with the receivers to their ears.

* * The population of London now exceeds every other city, ancient or modern, in the world. New York and all its adjacent cities combined are not equal to two-thirds of it. Scotland, Switzerland and the Australian colonies each contains fewer souls, while Norway, Servia, Greece, and Denmark have scarcely half so many. Yet at the beginning of the present century the population of all London did not reach 1,000,000.

* * The Safety Electric Power Company have opened offices in the Orient Building, Nos. 41 and 43 Wall street, this city. They have secured from the Daft Company the rights to its inventions for certain territory, and are prepared to furnish light plants, motors, etc., and to equip street railways with their improved motors. J. Murray Mitchell, Counsel and President; Wm. R Crowell, Treasurer; Henry S. Iselin, Secretary and Manager.

* * A good many people will be surprised to learn that the biggest building in the United States will be the City Hall of Philaphia, now in process of construction. Between eleven and twelve millions of dollars have been expended upon it since 1872. It is estimated to cover 2,800 more square feet than the Capitol at Washington. The tower on the north side will be surmounted by a statue of Penn, and its extreme height when completed will be 535 feet. It has now reached a height of 270 feet.

* * Mention was made in the Academy of Sciences, Paris, of a house in Neufchatel which had been struck with lightning, and some one suggested that some old iron stored in the attic had attracted the electric fluid. M. Calladon immediately scouted any such idea. He said the iron had nothing to do with attracting the lightning, but had probably been a cause of the burning of the building of the building after it had been struck. The explanation of that is that a combustible substance placed between two conducting surfaces—in this case the humid atmosphere and the pile of iron—is generally sure to take fire when an electric current is passed through it from one conducting surface to the other. The lightning having struck the house, it found its way to the metal within and ignited whatever combustible material it passed.

* * The loss of the Oregon has brought out many suggestions for avoiding collision at sea. One which is worthy of notice is that of a Scotch engineer. He does not purpose to supersede the usual sidelights, but supplements them with two others. The officer on watch is supplied with a pair of signals small enough to be carried in a breast coat pocket of ordinary capacity. Should he wish to indicate that his vessel is on the port tack, he takes a signal—with a round handle and colored red—from his pocket, and fires it by giving it a slight tap. The result is a brilliant red light. After this light has burned for about thirty seconds, it explodes a small maroon, the report of which can be heard a mile off; and after this the light continues to burn for another thirty seconds. The process of firing the starboard tack signal is, of course, the same, the result being a green light; but, in this case, the handle is square, this difference in form making it easy in the dark to distinguish the right signal to be employed.

Electrical News from Belgium.

[From the REVIEW's Correspondent.]

The situation of electric lighting is now advancing in this country. There are several companies devoted to this business. The most competent are L'Electrique, with Brush system and accumulators; La Cie Generale d'Electricite, with Gramme and Gulcher dynamos and lamps; La Cie. Industriele d' Electricite, with the Sun lamps; M. Bauckuert & Cie, with the Schuckert system. The Thomson-Houston Electric Co., of Boston, opened, a few months ago, a European agency at Brussels.

Some stations of railway, Schærbeck, Courtray, Gaetbrugge, Montigny, Luttre, are lighted by arc lamps, but the last tenders for Antwerp and Arlon stations have given the preference to gas, competing with Brush-Schuckert, Thomson-Houston systems, because the working cost was only considered, although the quantity of light offered by electricity was three times as much as offered by gas. The electricians have presented a protestation to the Ministre des Chemins de Fer, who is personally very favorable to the electric light, therefore it is to be hoped that in future contracts will be presented in more satisfactory conditions.

The Hotel de Ville, of Brussels, one of the most splendid monuments in Europe, is now lighted by incandescent lamps. The plant of this installation, carried out by M. L. Gerard & Co., is considered as satisfactory. The number of lamps, 16 and 8 candles, is about 300.

The Grand Place at Brussels is lighted by two 600-candle arc lamps, on poles 90 feet high. It is expected that other trials, with a larger number of lamps of less intensity, will be soon effected.

The main question now raised is the propulsion of tramcars by electricity. It seems undoubtedly and successfully solved here, after the experiments at Antwerp. You were mistaken in attributing in your number of the 17th April to Mr. Reckenzaun's system the decisive success obtained at Antwerp. Mr. Reckenzaun has never taken any part in the Antwerp competitions, and has only made some trials at London and Berlin. The electrical tramcar shown in the Antwerp exhibitions was presented by La Societe L'Electrique, and awarded by unanimity the diplome d'honneur.

The car was devised and built under the superintendence of Mr. E. Julien, the general manager of the Societe L'Electrique, who has invented a new accumulator of a high degree of perfection.

We are told that two lines, together about three miles long, of the tramways of Brussels shall be soon entirely worked by electricity. Ten cars are now in construction, and other lines should follow. A.A.

BRUSSELS, May 3.

The District Messenger Boy.

The District Messenger boy is a great institution. He is not always speedy, to be sure, but he is indispensable. The numerous attempts at scientific, mechanical and automatic devices made in the last few years to the end of doing away with the messenger boy have proved failures. He lives in spite of the pneumatic tube and telephone, and will survive any creation that attempts his extinction. Every device gotten up with the view of superseding him, instead of driving him from the field, has increased the need for his services. In consequence, he has become more numerous, more aggressive, more independent, and, if possible, more dilatory. Each device has created more duties for the boys, and, no matter how perfect the systems of communication be made, it seems as if the principle begins and ends with a messenger boy.

"The papers is always givin' us fellers a dig," said one of these boys to a reporter recently. "We hain't never safe from their attacks—only wen there's a 'lection and they goes fer ther polertishuns. Do you gillies think that because we fellers are togged out in blue and red we forgets we are boys. I s'pose you think rules and regerlations is a goin' to take a real live boy an' make a machine of him. Boys 'll be boys, unless he's a duffer, and then he hain't no 'count for a messenger. I tell you a messenger boy has got ter have sharp wits. You can bet yer life we sees as many tings wot's hid from the rest of the world as you newspapers fellers do. If you want the calcium turned onto some dark cases any time, just you try one o' our gang. I've seen the coppers bluffed lots o' times wen me and my pal's been goin' in and out of a place rite under their eyes. I tell you, cull, if I was to tell you what I knows 'about some people I could break up many a peaceful home. People kick because we fellers lie sometimes. Don't you know that lyin' is a part of our bizness. A man gives a boy a letter ter take home ter his wife. He gets the note from a man in a poker room, a concert hall, or some other place like that. When he gets to de man's house, though, he has to tell de lady dat he got the letter from de man at his offis, where he left him lookin' almost dead from hard work. It is no use to talk, I tell you, the messenger boys hain't half so bad as people thinks they is."

The Electric Light in Buffalo.

The Mayor of Buffalo recently vetoed the ordinance giving the electric light to certain additional streets, and one of the papers of that city, in support of the Mayor's position, claimed that Buffalo was paying too much for its light as compared with other cities. The following table, carefully prepared by Mr. W. S. Frear, secretary of the Brush Company, of Buffalo, is published:

City.	*Price.*	*Remarks.*
Baltimore	70c.	
Brooklyn.....	50c.	
Buffalo.....	55c.	
Minneapolis ...	65c.	Water power.
Jersey City....	50c.	
Cleveland.....	5.82c. p. hr.	Buffalo pays 5.26c. per hour.
Rochester	45c.	Water power.
Philadelphia..	48 to 59½c.	Furnished by different companies at 48, 48½c., 52, 52½c., 55, 59½c.
Pittsburgh	55c.	
Toledo.....	70c.	
Syracuse.....	50c.	
New York	70c.	
Boston.....	65c.	
Newark, N. J..	55c.	
Albany	50c.	City owns lamps and posts, and maintains same.
New Orleans..	55c.	
Providence....	55c.	
Ithaca	80c.	
Hartford.....	65c.	
Nashville.....	70c.	
Cheyenne.....	73½c.	
Los Angeles...	91c.	
Denver.....	65c.	
Charlotte.....	50c.	
Evansville.....	50c.	Water power.

Average price, 59½c. per light.

"There is no city in the country, as will be seen," said Secretary Frear in the Buffalo *News*, "that is supplied for less than 50 cents per lamp per night, except Rochester. In that city, where 300 lamps are now furnished for 45 cents each, the company has water power, which is rented out in the day, producing a handsome revenue and costing nothing for coal. In this city we use 12,000 tons of coal per year. Then Rochester gives a longer contract. The contract here is for but one year. The company is now contracting in Rochester for 900 lamps for three years at 30 cents. If we had water power here and as long a contract as there we could afford to do as well in Buffalo. As it is we establish all our plant just the same for one year as for more, and take the chances of the contract being renewed at the end of the year. This, with the cost of fuel, makes the difference."

The $250,000 Suit Against the Western Union Won by the Plaintiff.

James H. Goodsell, the former President of the National Associated Press, last week in the Superior Court, before Judge O'Gorman and a jury, was given a verdict of $250,000 against the Western Union Telegraph Company. Goodsell had made a contract with the Atlantic and Pacific Telegraph Company for the transmission and dissemination of news, but not long after the contract went into operation the Atlantic and Pacific Company fell into the hands of the Western Union Company, which assumed all its obligations. Soon afterwards the Western Union demanded higher rates of toll than were specified in the contract, but Goodsell refused to pay them, and the service was discontinued. Goodsell then sued the company in the Superior Court to recover $22,000, which he claimed had been collected on his account, and for $650,000 as damages for breach of contract. Ex-Judge James C. Spencer was appointed referee to try the case, and he gave judgment for Goodsell, fixing on $16,000 as the sum collected by the Western Union for him and on $220,000 as the measure of his damages through the breaking up of his business.

The Western Union Company appealed from this judgment of $236,000 to the General Term of the Court, which ordered a new trial on the question of the damages for the breach of contract, but affirmed the judgment as to Mr. Goodsell's claim for money collected. From the latter judgment the company have appealed to the Court of Appeals. The new trial upon the question of damages for breach of contract has occupied the attention of Judge O'Gorman and a jury for over two weeks past. Messrs. Miller and Savage were the counsel for Mr. Goodsell, while Gen. Wager Swayne, Burton N. Harrison and Melville Eggleston represented the Western Union Company. Judge O'Gorman charged the jury that it was for them to say whether there had been a breach of contract, and if so to what extent had Mr Goodsell had been damaged. The jury was out about two hours, and returned with a verdict of $250,000 in favor of Mr. Goodsell. To this sum the Court granted an extra allowance of $1,750 to his counsel. The company will undoubtedly appeal from this verdict.

Annual Statement of Treasurer Embler, of the Southern New England Telephone Company.

1886.

Earnings.....	$263,867 99	
Expenses.....	193,740 47	
		$70,127 52
Disposition of Net Earnings.		
Dividends.....	$60,638 50	
Contingent.....	6,842 03	
Profit and loss.....	2,646 99	
		$70,127 52
Plants and Construction.		
Plants April 1st, 1885.....		$1,219,512 09
Construction April quarter, 1885.....	$3,209 42	
Construction July quarter, 1885	3,719 14	
Construction October quarter, 1885.....	4,359 05	
Construction Jan'y quarter, 1886.....	2,098 04	
		13,385 65
		$1,232,797 74
Sold to Am. Bell Tel. Co ex-territorial lines	$35,000 00	
Sold to Conn. River Tel. Co. telegraph lines.....	11,739 24	
Returned to supply department.....	1,724 58	
		48,463 82
Plants April 1st, 1886.....		$1,184,333 92
Construction April 1st, 1884, to April 1st, 1885.....	$52,568 16	
Construction April 1st, 1885, to April 1st, 1886	13,285 65	

Comparative Rental, Extra-Territorial and Construction Accts.

April Qr, 1884.		
Rentals		$52,153 27
" unpaid.....		8,206 24
		$60,359 51
Extra-territorial.....	$7,087 05	
Ex-ter. unpaid	1,391 10	
		$8,748 15
April Qr, 1885.		
Rentals		$54,754 64
" unpaid.....		8,357 05
		$63,111 69
Extra-territorial.....	$6,887 60	
Ex-ter. unpaid.....	688 95	
		$7,576 55
April Qr., 1886.		
Rentals		$57,334 15
" unpaid.....		9,043 12
		$66,377 27
Extra-territorial.....	$5,715 15	
Ex-ter. unpaid.....	847 59	
		$6,562 74

A Victory for Mr. E. H. Goff.

United States Commissioner John A. Osborn announced his decision last Thursday in the case of Edwards H. Goff, President of the American Electric Manufacturing Company, of this city, whose extradition to Canada has been sought on a charge of forging a resolution on the minutes of a meeting of the Canada Agricultual Insurance Company, of Montreal. The Commissioner, who sat as a committing magistrate, declined to commit the accused, holding that the charge had been disproved. The hearing in the case has been in progress since early in April, involving a great amount of testimony and argument. The Commissioner says :

"There is nothing in the minutes of previous meetings to show that the Executive Committee had lost faith in Goff's management of the affairs of the company. It seems that he was the Hercules of the company by way of carrying it through its financial losses ; for, I do not see that any other director interested himself much in its affairs, other than Angus, the President. * * * * Mr. Goff was the chief manages and sole financier of the company. He was clothed with discretionary power to raise money for the benefit of the Company. The minutes of the preceding meetings show that he was engaged in raising money in various ways. * * * *

"It is unnecessary to pursue the inquiry further. There are too many suspicious facts and circumstances surrounding this case to discuss the grave charge of forgery against Mr. Goff when it is evident that he did not attempt to flee the Dominion of Canada from July 17, 1877, to Sept. 24. 1878; that he offered the assignees of the Canada Agricultural Insurance Company, while Mr. Ross was investigating the books of the company, to arbitrate all claims against him and enter into bonds to pay the award, provided they would do the same ; that, after his arrest by the police magistrate for forgery and other offenses, he gave nominal bail to appear for trail, and after expensive legal controversies, becoming ruined financially, as he states, he on the 24th of September, 1878, publicly departs from Montreal to Boston, making his home there, and which was known to Ross and others within six months after his departure.

"No effort has been made from that time until now to extradite him for the grave offense of forgery, notwithstanding he has advertised himself and his place of business from time to time in Canadian newspapers.

"Looking at the evidence in this case, with a view to conform to the practice established in extradition proceedings ; conscious of the fact that the complainant is the Government of Great Britain ; that the question of good faith on her part in asking for the extradition of this man is not to be considered by me as examining magistrate ; conscious, too, that the question of laches on the part of the demanding Government is no part of the inquiry here ; nevertheless, I am constrained in the discharge of my duty to view in the light of reason and law the conduct and good faith of the witnesses who are the parties interested in having the accused extradited, and on whom the Canadian Government rely to sustain the charge of forgery, in order that I may contrast and weigh the testimony on the part of the prosecution when in conflict with that of the defense, and reach the truth, as nearly as a disinterested mind can, in sifting evidence.

"The accused is entitled to be discharged, and I so order."

An Apparatus for Reproducing at Pleasure an Invariable Quantity of Electricity.

By M. Marcel Deprez.

The instrument which I have the honor of submitting to the Academy has for its object the easy reproduction, at any time and under any conditions of pressure and temperature, the quantitative unit of electricity which has received the name of the *coulomb*.

It consists of a **U**-tube, the two limbs of which have been sealed at the lamp and terminate in glass balls, the volume of which is much more considerable than that of the cylindrical portions. One of the balls, as well as the corresponding limb, is completely filled with water, acidulated with phosphoric acid ; the second limb contains likewise a little of the same liquid in its lower portion, but in the greater portion of its length it is filled with air at a given pressure, as is also the ball in which it terminates. The limb filled with liquid has four platinum wires fixed in pairs opposite to each other, one pair in the upper part of the ball and the other in the cylindrical portion, a little below the bottom of the ball. If an electric current is directed into the two latter, the water is decomposed and the detonating mixture resulting from this decomposition accumulates in the upper ball whilst the liquid driven into the second limb ascends in it, compressing the air in the second ball. If we take care to note the point of departure of the liquid column in the second limb, which is divided into parts of equal capacity, as well as the point at which it stops on suppressing the current, we have all the data necessary for knowing the quantity of electricity expended in producing the detonating gaseous mixture. It is easy to see that if the volume of this mixture, measured by the rise of the liquid in the second limb, is always the same, the quantity of electricity needful for its production will likewise be invariable, and this whatever may be the temperature of the instrument, provided that it is the same in the two limbs, a condition easily realized.

As for the barometric pressure and the hygrometric condition of the air, they have evidently no influence on the result, since the tube is hermetically sealed. Lastly, the liquid being always the same, it will be seen that this instrument allows of the reproduction, whenever required, of a quantity of gas corresponding to an invariable quantity of electricity taken as a standard, the operation consisting simply in reading off a volume, which is always the same, without any correction being required; whilst with the ordinary voltameter, the corrections for temperature, for pressure and vapor-tension can by no means be neglected.

In order that the instrument may serve indefinitely, it is necessary to reconstitute the water decomposed at each operation; this is the purpose of the platinum wires situate in the upper part of the balls where the detonating mixture accumulates. It is sufficient to pass a spark between these wires to induce the combustion of the detonating mixture. The acidulated water again fills the ball, and the instrument is ready for a fresh operation. The apparatus may be made more or less sensitive by filling the second branch before sealing, with air of a greater or less pressure than that of the atmosphere.

As to the use of this instrument for graduating instruments intended for electric measurements, I think it is useless to enter into details.

This instrument has been submitted to numerous experiments, in which its indications have been compared with those of the ordinary voltameter, with all the corrections required for temperature, atmospheric pressure, etc. These experiments, made with great care by M. Minet, one of the engineers attached to the experiments at Creil, have shown that the indications of the new apparatus are fully trustworthy.

—— The electric lighting in Brooklyn is rapidly taking the place of gas for illuminating its streets. In a few days the whole length of Court street, together with Hamilton avenue, from Court street to Third avenue, will be beautifully illuminated by electricity.

—— Railroads which have difficulty in paying less than ten per cent. on the par value of their capital stock might, where a State law provides that all excess of earnings should be paid into the treasury of the State, benefit the public more generally than they do now by providing better illumination in their passenger cars. The two or three candle oil lamps often smoke or go out and leave the car more dimly lighted than many of our streets before the advent of electricity. The problem is simple when the motive power for a railroad is electricity. There is, however, a large field for the perfecting and application of some of the systems proposed for train lighting.

—— The New York Life Insurance Company, on Broadway in this city, are putting in the Brush-Swan incandescent electric light. The plant will be a large one. Chas. Higgins, soap manufacturer, of Brooklyn, is putting in an additional plant of the Brush-Swan system.

—— The Brush Company, of Rochester, N. Y., Mr. Geo. Redman, general manager, have 750 lights in use, 300 paid for by the city. Four large water wheels are used in connection with the water-power, and the company is now placing 15 additional ones, and will furnish power as well as light to all customers.

—— The contract for lighting the streets of Patterson, N. J., has been divided between the electric light and gas companies of that city. Fifty arc lights will be needed, and are to be ready by June 1st. Mr. Noonan, of the electric light company, engaged a large number of men to commence work putting up the poles and wires at once, and gave orders for the lamps, frames and other things necessary. It will cost a good many thousand dollars to get things ready by June 1st. It is a singular coincidence that the Passaic City Council on the same night ordered twenty-five arc lamps put up in the streets of that place. The officers and directors of the Patterson Electric Light Company are as follows: President, Eugene Stevenson; vice-president, John Norwood; secretary, John F. Noonan; treasurer, Dr. T. Y. Kinne; superintendent, George F. Matthews. The directors are: Hon. G. A. Hobart, F. A. Potts, Jr., Eugene Stevenson, John Norwood, Hon. D. C. Bolton, R. M. Ekins, John F. Noonan, Dr. T. Y. Kinne, and Robert Blackburn. The offices of the company are at 207 Main street.

A New Electric Firm.

Messrs. Henry S. and Horace D. Thornberry, two capable electricians, have formed the firm of Thornberry Bros., and purchased the electrical works of F. D. Jackson, 332 Seventh avenue, this city. The new firm will do electrical work of all kind, including electro plating.

Good Showing for a Primary Battery.

Editors Electrical Review :

We note Dr. A. V. Garrett's speech before the National Electric Light Convention, appearing in your issue of February 27th, and, as we have an experience extending to over 2,000 lights running off primary batteries, we may feel justified in saying that it will be rather difficult for him to show better results than ours.

The operating expenses are, here in London, five shillings per charge for solution for battery which will run twelve to fifteen eight-candle power lamp (Swan) for a total of 180 to 210 lamp hours the variation being due to the state of cleanliness of the batteries and proper attention to the amalgamation of zincs. To this figure about one shilling must be added for zinc consumed. This gives, you see, $1.50 for 200 lamp hours, and we shall be glad to have a comparison of results. Laing, Wharton & Down.

London, E. C., May 10.

The Electric Club Meeting.

This newly organized club met at its headquarters at the Hotel Dam, Thursday evening May 20, the large attendance indicating an increasing interest in the project. The committee on invitations reported an assured membership of about fifty, and expressed the opinion that from the interest displayed the growth of the club would be very rapid. Complete constitution and by-laws were adopted, and the secretary instructed to have them printed. The dues were fixed at $15.00 per year, payable semi-annually, and the initiation fee at $10.00. The committee on membership, to whom all applicants for admission will be made, was duly elected, and is composed of five members. A committee of three members, Messrs. Barney, Beetle and Dutton, was appointed to investigate the plan of engaging a down-town annex, where the members of the club could meet from 12 to 2 o'clock each week day, and lunch together. The meeting adjourned to meet again at same place in two weeks, the club to dine together at 6 o'clock, and convene in regular session at 8 o'clock.

Electric Light News

—— The streets of Batavia, N. Y., are to be lighted with forty arc lamps.

—— The city of Grand Rapids, Mich., is now lighted by eighty-four electric lamps.

—— Newburgh, N. Y., has decided against electricity as an illuminant. The sufferers by this will be the citizens of Newburgh.

—— The Defiance, Ohio, Electric Light Company has filed articles of incorporation; capital stock, $15,000.

—— Poughkeepsie expects to have her electric light plant in operation inside of ten days.

—— The Illuminating Company, of Detroit, to operate an incandescent system, has been organized, with a capital stock of $250,000.

—— Two hundred citizens of Concord, N. Y., have petitioned the city council to light Main street by electricity. This will probably be done.

—— The extensive tobacco establishment of P. Lorillard, Jersey City, has contracted for a large number of incandescent lights of the U. S. Electric Company, Weston system.

—— The citizens of Montreal, Canada, are petitioning the city council to extend the electric lighting along the whole of Notre Dame street.

—— The Wagner Palace Car Company, of Buffalo, are negotiating for an incandescent electric light plant, and will probably adopt the reliable Sawyer-Man system.

—— The Waterhouse Electric and Manufacturing Company, of Hartford, Conn., have issued a neat catalogue, presenting in handsome form the claims of their new system of electric lighting.

—— The Royal Electric Light Company, of Montreal, has been granted a five-years' contract to light up St. Catherine, St. Lawrence, Craig, Notre Dame, McGill and St. James street by electric light for $24,000 per annum. The system is Thomson-Houston.

—— A charter has been granted to the Scranton (Pa.) Illuminating Heat and Power Company, capital $100,000. There was a protest against this company on the grounds that another company in Scranton had the exclusive right to furnish electric light. It was decided in favor of the applicant.

—— The Citizens Electric Light Co. of Akron, Ohio, operates 200 Thomson-Houston arc-lights. This company has recently contracted with the United States Electric Lighting Company for a number of their incandescent lights, which will be used in that city.

—— A copy of the proposed contract which the Detroit Tower Electric Light Company will make with the city of Columbus, Ohio, has been filed there. It provides that there shall be forty-three towers, each having four 200 candle-power lamps, and that the pay shall be $3,958 30 per month.

—— The Long Island Electric Light Company, limited, capital $100,000, is incorporated, with objects to furnish electricity, electric motors and all other things appertaining to electricity. The location of the business will be at East New York. The trustees are Henry C. Buckhout, Hannah E. Powell, of Brooklyn; and Charles E. Wright, C. Frank Colyer, and John J. Immick, of East New York.

—— The committee on street lights of the San Francisco Board of Supervisors have reported favorably upon the bid of the California Electric Light Company which is to supply electric light for twenty-four masts 150 feet high, in outlying districts, at $5.28 each per night; for three masts 100 feet high, at $5.28 each per night; and for one mast 40 feet high, at 66 cents per night. The annual cost of this contract would be $48,195. The total cost of lighting the city by both gas and electricity will be $264,686.84.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING MAY 18, 1886.

341,873 Electric laryngoscope; Havens B. Bayles, Brooklyn, N. Y.

341,907 Galvanic battery; Alonzo C. Harris, Louisville, Ky.

341,909 Electric annunciator and fire alarm; Albert T. Hess, Des Moines, Iowa.

341,918 Indicator for electric circuits; Oscar F. Jonsson, Stockholm, Sweden.

341,926 Gas electric advertiser cock; Leon Linaerts and Henri L'Olivier, Brussels, Belgium.

341,961 Armature for electro-magnets; Orosco C. Woolson, Newark, N. J., assignor to Charles A. Cheever, trustee, New York, N. Y.

341,990 Dynamo-electric machine; Chas. Batchelor, New York, N. Y.

341,997 Incandescent electric lamp; Louis J. Crossley, Halifax, County of York, and James J. Hicks, 8 Hatton Garden, County of Middlesex, England.

342,013 Watchman's electric time recorder; Charles W. Holtzer, Brookline, Mass.

342,018 Electric valve; Warren S. Johnson, Whitewater, assignor to the Johnson Electric Service Co., Milwaukee, Wis.

342,065 Machine for covering wire; William D. Grimshaw, New York, assignor to John L. Arts, Troy, N. Y.

342,086 Electric pendulum clock; Friederich Haenichen and Otto Haenichen, Philadelphia, Pa., assignors to themselves and Oscar Seebass, New York, N. Y.

342,114 Thermostatic circuit-controlling device; Morris Martin, Malden, Mass.

342,280 Electrical conduit; John R. Burdick, Chicago, Ill.

BUSINESS NOTICES.

Wanted—Situation as manager or inspector of a telephone exchange; have had an experience of 6 years; can furnish excellent testimonials from last employers; having resigned my position about three months ago as manager of an exchange of 300 subscribers to go into the Hill Burglar Alarm business, which has proven a failure; can do anything pertaining to the business. Address

PENNSYLVANIA TELEPHONE CO.,
Bethlehem, Pa.

Dr. Van de Weyde, President of the N. Y. Electrical Society, inventor of various useful electrical devices, and author of a multitude of articles published in the electrical journals, and expert examiner of patents of this class, is open for an engagement as electrician of a company or enterprise where his theoretical and practical knowledge, aided by an experience of many years, especially with electro-motors, can find useful application. For reference see his biography in Johnstone's Cyclopedia. Call at the patent offices of David A. Burr, Cooper Union, between 2 and 3 o'clock P. M., or address at residence, 236 Duffield street, Brooklyn, N. Y.

PRECAUTIONS to be ADOPTED
ON INTRODUCING
THE ELECTRIC LIGHT.
With notes on the Prevention of Fire Risks, and a glossary of common terms used in Electrical Engineering. By Killingworth Hedges.
Price $1.00.
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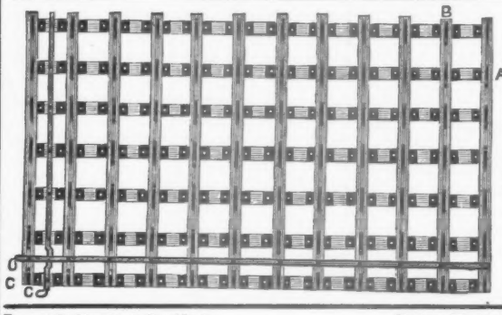

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DESCRIPTION.
The brass strips A cross the brass strips B and are insulated at the intersections. Connection is made at C with bell and battery. The slightest pressure completes the circuit.
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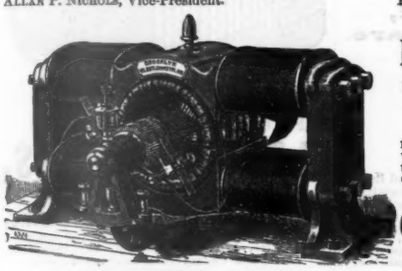

KNOWLES-MOFFATT ARC SYSTEM.

THE
American Bell Telephone Company

95 MILK ST., BOSTON, MASS.

This Company owns the Letters Patent granted to Alexander Graham Bell, March 7th, 1876, No. 174,465, and January 30, 1877, No. 186,787.

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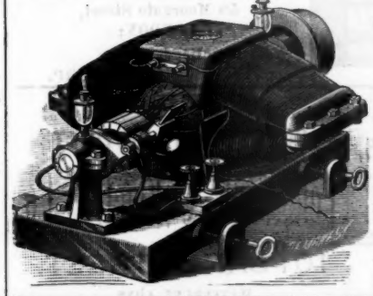

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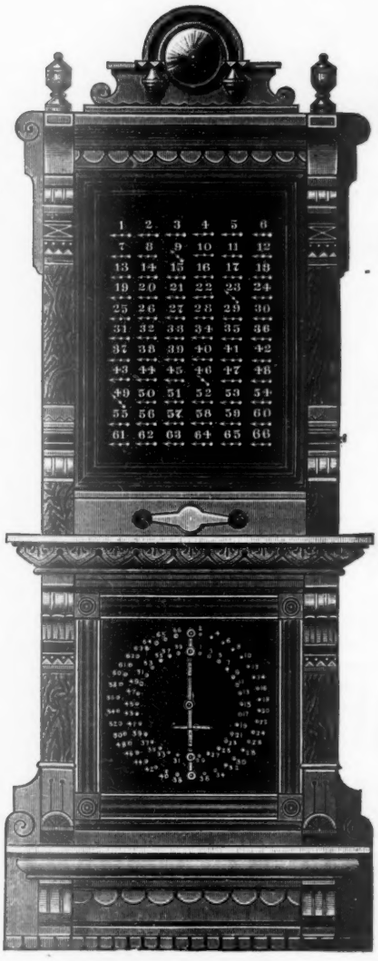

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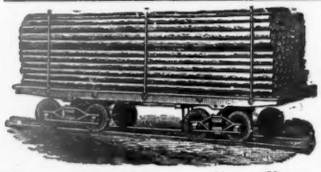

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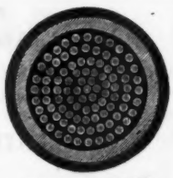

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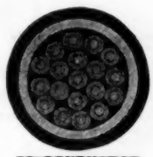

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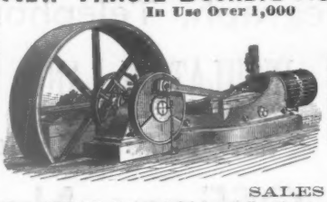

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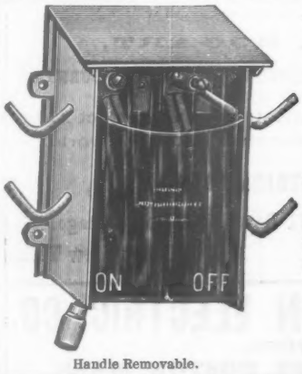

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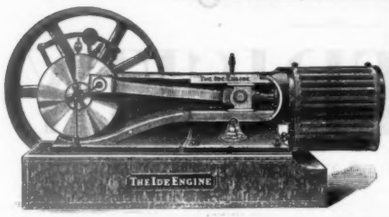

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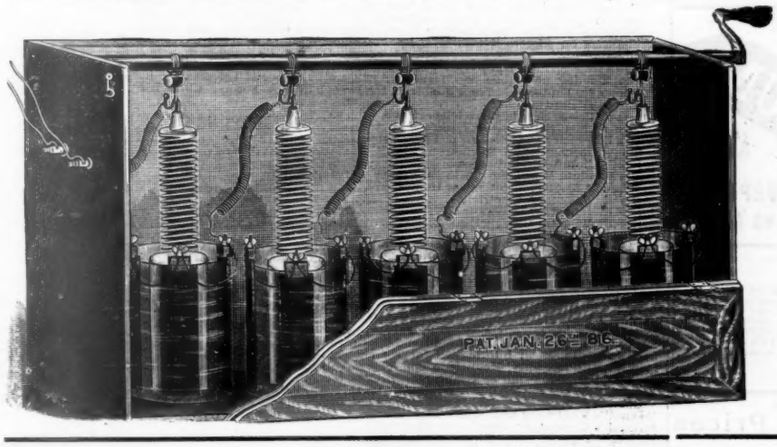

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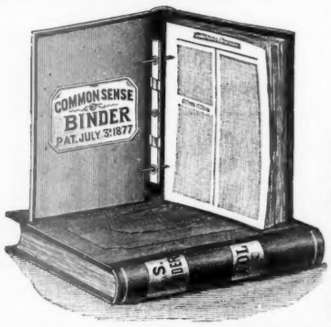

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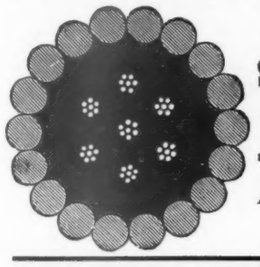

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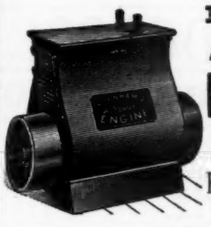

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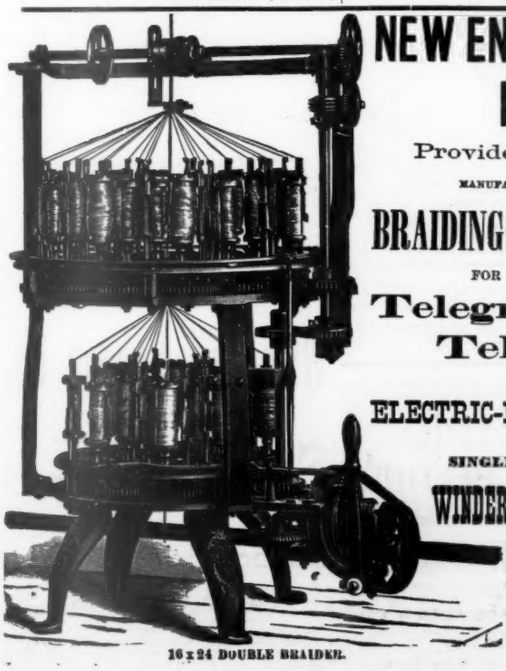

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